

APP 541

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Read This First

Read This First

This manual is applicable to the following versions

- Hardware: APP 541
- Operator panel: AFH1801 Rev 1.02 or later
- I/O-module: AHH1801 Rev 1.02 or later
- Com-module: TMX1801 Rev 1.00 or later
- System Software: 2.73 or later
- Application: 1.44 or later

Introduction

Before starting to use APP 541, read this chapter carefully. It contains general information on documentation, safety and guarantee.

Product Overview

APP 541 is a pump controller that consists of an I/O module and an operator panel.

APP 541 can use a PSTN, GSM, GPRS or radio modem to communicate with a SCADA system, for example AquaView. A special communication module is available for this purpose.

Safety rules for the owner/operator

- All government regulations, local health and safety directives must be observed.
- All danger due to electricity must be avoided.

Guarantee

- Modifications or changes to the unit/installation should be done only after consulting Xylem.
- Genuine spare parts and accessories authorized by the manufacturer are essential for compliance with the terms of the guarantee. The use of other parts may invalidate the guarantee.

This manual

- In this manual, APP 541 is generally referred to as the RTU.
- In order to avoid repetition of information, the manual describes how one pump P1, should be read or entered.
- If a second pump or more pumps, are included in the installation, these instructions must be repeated for each additional pump.

Symbols used

NOTICE:

- *Special information about a function.*
 - *Information concerning the Central system.*
 - *Information about alarms.*
-

Terminology

The table below describes the terms and abbreviations that are used in this manual.

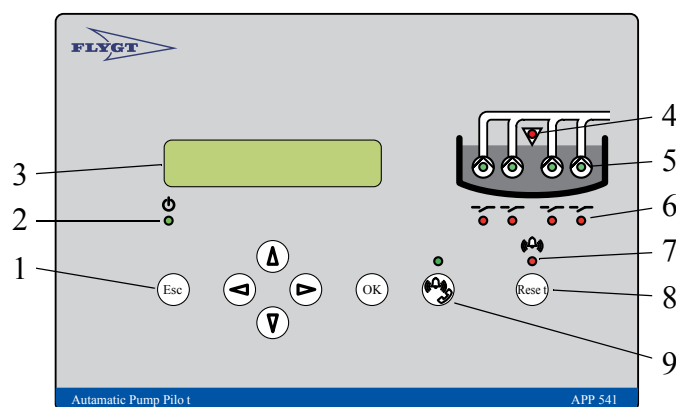
Abbreviation	Full Term	Description
CS	Central System	Used in menus. The term means SCADA system.

Abbreviation	Full Term	Description
RTU	Remote Terminal Unit	Unit for supervising and controlling a pump station, for example APP 541.
SCADA	Supervisory Control And Data Acquisition	PC based system aiming to create an overview; the operator can monitor process information and influence and change the process values. The system allows logging, trending and remote commands as well as presenting process data as significant digits, staples, curves, trends, or as symbols varying in colors and sizes.

Shortguides

Shortguides

Front panel



1. Display
2. Power LED
3. Push buttons
4. High level LED
5. Pump status LED
6. Relay status LED
7. Alarm status LED
8. Reset
9. Remote alarm On/Off

Push buttons

	Escape: Exit a menu without saving any changes. Exit a sub-menu.		Up arrow: Scroll backwards one menu at a time. Edit a value.
	Left arrow: Go back. Move the cursor to the left, while editing a value.		OK: Display the first menu in a sub-menu group. Save a specified value.
	Right arrow: Advance. Move the cursor to the right, while editing a value.		Remote alarm On/Off: When remote is on, alarms are transmitted to CS/SMS.
	Down arrow: Advance one menu at a time. Edit a value.		Reset: Acknowledge a new alarm. It is not removed from the alarm log.

View pump running hours and number of starts

1. Display the Operating data (7_) menu, and press OK.
2. Repeat for P1 Start counter (7_1), and P1 Run hour (7_2) to P4 Start counter (7_3) and P4 Run hour (7_4) respectively.

View and delete alarms

1. Display the Alarm log (1) menu and press OK.
2. Browse the log by repeatedly pressing the Down button.

3. Scroll to the required alarm and press OK. Result: A "Delete alarm?" message appears and "Current" is displayed.
4. Choose between "Current" and "All" by pressing the Down button and then OK. Result: The alarm is cleared and the text "Log cleared" message is displayed.

Change a parameter value, for example a level setpoint

1. Display the Level (2_) menu and press OK.
2. Select the menu you want to change (Start / Stop level 1-4 or High / Low level). Press OK.
3. Select a new parameter value or alternative. Press OK.

Show installation and service menus

To show menus that are used only during installation or service, select "Yes" in the Show more menus menu (18). The backlight is switched off when the display has been idle for ten minutes.

Menu reference chart

Legend (Flygt default settings):

Always shown:



Normally hidden:



Shown depending on configuration:

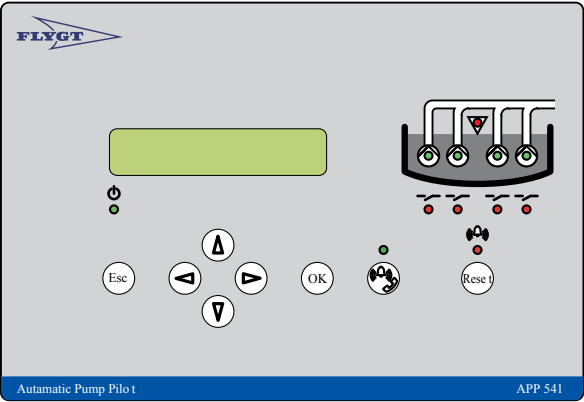


[illegible]

Front Panel

Front Panel

Illustration: Front panel



LEDs on front panel

	Power LED		High level LED
	Communication status LED		Pump status LED
	Alarm status LED		Relay status LED

(Reference: "Monitor Status on Front Panel" for an explanation of LED functions).

Push buttons on front panel


The push buttons are used to browse menus, and edit parameter values. Each menu has an indicator, for example "20".

- The indicator is shown for 3 seconds only.
- An underscore after the last number indicates a submenu, for example "2_".

(Reference: "List of Menus" for a complete list of menus).


Viewing a menu

	Use the Up arrow to scroll backwards one menu at a time.
	Use Down arrow to advance one menu at a time.
	Press OK to display the first menu in a submenu group.





	Press ESC to return to the last menu shown in the previous menu group.
---	--

Changing a parameter



Display the relevant menu as described above, and then:

	Press OK. Either: A flashing cursor appears, <i>or</i> The text "Read only" is displayed.
---	---

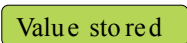
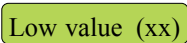
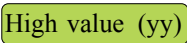
If the value is numerical, move cursor to relevant position.

	Advance with the Right arrow
	Move backwards with the Left arrow.
	To select a higher value, press the Up arrow.
	To select a lower value press the Down arrow.

For text menus, the next available alternative is displayed instead of a value.

	Press OK to save the specified value.
	Press Escape to exit the menu without saving.

When you save a value, the result is displayed:

	Value has been saved.
	Value is below permissible range (xx). Enter a higher value.
	Value is above permissible range (yy). Enter a lower value.



Show installation and service menus

To show menus that are used only during installation or service:

- Select "Yes" in the Show more menus menu (18).
- If the password function is in use, enter the password instead.

NOTICE:
When the display has been idle for ten minutes:
Backlight is switched off.
Only default menus are shown.

Miscellaneous buttons

	Shift between remote and local alarm handling. (Reference: "Disable Alarms Temporarily").
	Acknowledge a new alarm. It is not removed from the alarm log. (Reference: "Monitor and Erase Alarms in the Alarm Log").

Language

The display language is changed in the Language menu (20_). Look for the



symbol. It is shown in the top-left corner of the Language menu.
To show parameter values in U.S. units, select the language "English US".

Configure Basics

Configuration Startup

To show parameter values in U.S. units, make sure the language "English US" is selected in the Language (20) menu.

To access to the configuration menus:

- Select "Yes" in the Show more menus menu (18).
- If the password function is in use, enter the password instead.

Configure I/O-module Communication

Communication between the I/O-module and the operator panel must be set up.

Before using this function

- Obtain MAC address. (Reference: Bar code on I/O-module housing).
- If the I/O-module is connected to an intranet, obtain two consecutive IP-addresses from the network administrator.

Bar code with MAC address

The MAC address is the last 9 digits of the bar code.

Example:

Bar code	10.255.240.017
MAC address	255.240.017

Type of communication

The operator panel and I/O-module can be connected in two ways:

- Local network: direct connection with cable.
- Intranet: both modules are connected to an intranet.

Types of IP addresses

The RTU uses two consecutive IP addresses:

- First address is called BaseIPaddress. It is used by the operator panel.
- Second address is derived from the first. It is used by the I/O-module.

Local network

In this case, the default Base IP address is sufficient. If desired, any of the following free addresses can be used instead:

- 10.0.0.0 to 10.255.255.255
- 172.16.0.0 to 172.31.255.255
- 192.168.0.0 to 192.168.255.255

Configure I/O module communication

Specify the MAC address in the I/O-module MAC addr. menu (17_6_2).

1. If necessary, specify the first of the two consecutive IP addresses in the Base IP address menu (17_6_1).
Keep in mind: If the modules form a local network, the default Base IP address is sufficient.
2. If necessary, specify a new IP communication timeout in the IP timeout menu (17_6_3).
Keep in mind: the default value is appropriate for most installations.

Configure Analogue Level Sensor

An analogue level sensor can detect the sump level.

Before using this function

Obtain data on maximum sensor range. (Reference: Sensor documentation).

Zero-level

When the sump level is below the sensor range, the RTU should show "0.00" or some other acceptable value as sump level.

Since value are rounded, it is not necessary to have exactly "0.00". For example, "0.01" can be acceptable as zero-level.

Sensor calibration

It may be necessary to trim the zero-level.

Example: If the displayed zero-level is -0.20, required offset is 0.20.

Configure analogue level sensor

1. Specify the maximum sensor range in the Sensor range menu (2_12).
2. Raise the sensor out of the liquid.
3. Level menu (2_) should read "0.0". If not, specify the offset in the Sensor calibration menu (2_13). (This is usually the distance between the sump bottom and the sensor).
4. Lower the sensor into its proper location.

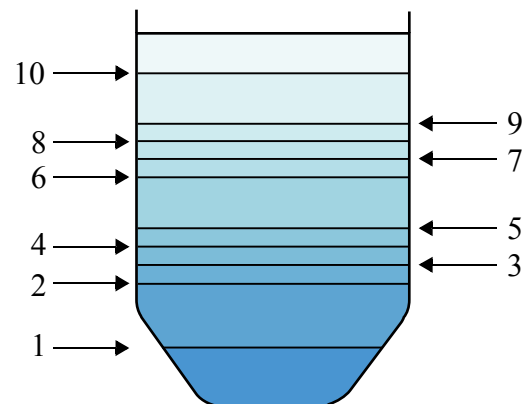
Related configuration

Configure also analogue levels. (Reference: "Start, Stop, High and Low Levels".

Start, Stop, High and Low Levels

The specified levels determine when a pump normally starts and stops.

Illustration: Type of levels



1. Low level
2. Stop level 1
3. Stop level 2
4. Stop level 3
5. Stop level 4
6. Start level 1
7. Start level 2
8. Start level 3
9. Start level 4
10. High level

Function: Analogue levels

If sump level...	Then...
exceeds High level limit	high level alarm is generated
exceeds a Start level	one pump is started
drops below a Stop level	one pump is stopped
drops below Low level limit	the following takes place: All pumps are temporarily blocked Low level alarm is generated

Configure analogue levels

Specify the lowest start level in the Start level 1 menu (2_1).

1. Specify the lowest stop level in the Stop level 1 menu (2_2).
2. If there is a second pump, specify Start/Stop level 2.
3. Specify alarm limits in:
 - High level menu (2_9).
 - Low level menu (2_10).

Disable a pump

1. Set a start level to "0".
2. Set the corresponding stop level to "0".

Disable low level block

Set low level alarm limit to "0".

Configure I/O

Configure General Purpose Inputs

General purpose input 1–8 can be connected to several types of external equipment.

Types of functions

Function	Description
Px auto (P1 - P4 auto)	General purpose input 5–8 can be assigned as automatic mode input for pump 1–4.
Blocking	When the input is activated: <ul style="list-style-type: none"> • All pumps are blocked. They remain blocked as long as the blocking signal remains active. • A blocking alarm is generated.
External alarm	General purpose input 1–8 can be assigned as Alarm input 1–8. When an input is activated, the corresponding external alarm is generated. For example, "Alarm input 3".
High level	When the input is activated: <ul style="list-style-type: none"> • Available pumps are started. • A high level alarm is generated.
Low level float	When the input is activated: <ul style="list-style-type: none"> • Pumps are temporarily blocked until start conditions are fulfilled • A low level alarm is generated.
Px manual (P1 - P4 manual)	General purpose input 1–4 can be assigned as manual mode input for pump 1–4.
Overflow	The input from the overflow sensor is used to: <ul style="list-style-type: none"> • Measure number of overflows, and major overflows. • Measure accumulated overflow time. • Estimate overflow flow and volume.
Personnel	The input is connected to a selector switch, usually a light switch in the pump station. When flipped, the personnel alarm function is activated.
Power failure	The input is connected to a device supervising mains power supply. When the input is activated: <ul style="list-style-type: none"> • Mains error alarm is generated. • All pumps are blocked.
Rain meter	Used to measure rain fall.
Px Spare alarm (P1 - P4 Spare alarm)	When the input is activated, a spare alarm is generated.
High temp. Px (High temp. P1 - P4)	The thermal contact for a pump is normally closed. When opened: <ul style="list-style-type: none"> • The pump is blocked. It remains blocked as long as the thermal contact remains open. • A high temperature alarm is generated.

Exception: EX-mode

In EX-mode, General purpose input 1–4 are automatically assigned as manual mode inputs for pump 1–4. (Reference: "EX-classified Environment").

Exception: Three pumps or less

The inputs for pump 4 are assigned automatically as inputs for high and low level switches. (Reference: "Extra Options With Three Pumps or Less".)

Menus to use

Function gen.input 1-8 menus (17_5_1 - 17_5_8).

Related configuration

- Automatic and manual mode is further described.
- External alarms can have local alarm texts.
- If a high level switch is used, configure the high level runtime.
- Manual mode is further described.
- If used, configure the personnel alarm.
- Optionally, configure overflow calculations.
- If used, configure the rain meter.

Other Inputs

Automatic/Manual Mode for a Pump

An external device can be used to switch between automatic, manual and blocked mode for a pump. Example: manual-0-auto switch.

Before using this function

- Optionally, configure a General purpose input as manual mode input.
- Optionally, configure a General purpose input as automatic mode input.

Input configurations

Manual input	Auto input	Pump state
Both inputs are used:		
Active	Passive	Running
Passive	Active	Controlled automatically
Passive	Passive	Blocked
Only a manual mode input is used:		
Active	Not connected	Running
Passive	Not connected	Controlled automatically
Only an automatic mode input is used:		
Not connected	Active	Controlled automatically
Not connected	Passive	Blocked
No inputs are used:		
Not connected	Not connected	Controlled automatically

Motor Protection

A pump can use motor protection.

Before using this function

This function requires that the motor protection is connected to the Motor protector input for the pump.

Function: Motor protection

When the input is activated:

- Pump is blocked.
- A tripped motor protection alarm is generated.

Related configuration

A tripped motor protection can be reset. (See Reference).

Feedback from Pump Relay

When the RTU tries to start a pump by activating its pump relay, the relay can provide feedback.

Before using this function

The pump relay has to be connected to the Start feedback input for the pump.

Function: No feedback from pump relay

Phase	Description	
1	RTU tries to start a pump.Result: RTU receives no feedback.	
2	There is no idle pump. Result: RTU: <ul style="list-style-type: none"> • Generates a No response alarm. • Keeps the first pump set to run. 	There is another idle pump. Result: RTU: <ul style="list-style-type: none"> • Generates a No response alarm. • Blocks the first pump. • Tries to start the next idle pump.

Power Failure

The power supply is supervised by the I/O-module.

Types of I/O modules

There are two types of I/O modules. They have different power supplies:

- 24 V, *or*
- 230 V. This type may have a 24 V battery backup.

Types of alarms.

Condition	Generated alarm
230 V power supply fails.	Mains error
24 V power supply is low or dead.	Low 24 V supply
24 V battery is low.	Low 24 V supply

Considerations

If a 230 V unit is supplied only through the 24 V battery backup supply, the 230 V fail signal must be inverted in order to avoid the mains error alarm. (Reference: "Troubleshooting").

Configure Outputs

Common Alarm Output

When an alarm is generated, alarm equipment such as a lamp or a siren can be turned on as well.

Before using this function

This function requires that the alarm equipment is connected to the common alarm output.

Function: Common alarm output

The output is affected by selected alarms. When an alarm is:

- Not acknowledged, the output is active.
- Acknowledged, the output is passive.

Configure Common alarm output

1. Select continuous or intermittent output in the Common alarm menu (17_4_1).
2. Specify alarms that will activate the output in the Com. alarm activ. 1-4 menus (17_4_2 -17_4_5).

For each alarm that can activate the output, select:

- 1 to enable the condition.
- 0 to disable the condition.

Other Outputs

Emergency Operation

If the RTU fails, an emergency operation circuit can take control of the pumps.

Before using this function

This function requires that the Emergency operation output is connected to an emergency operation circuit. (Reference: Installation manual).

Extra Options With Three Pumps or Less

Function: Three pumps or less

Some terminals on the MIO 501 I/O board can be used for other purposes:

- Terminals 40-41 are automatically re-configured as a Low level switch input.
- Terminals 42-43 are automatically re-configured as a High level switch input.
- Terminals 17-18 can be used as:
 - Flushing valve output,
 - General output, *or*
 - Output for motor protection reset.

Specify number of pumps

Specify the number of pumps in the pump station in the Number of pumps menu (17_1)

Related configuration

- There is no need to use General purpose inputs for high and low level switches.
- Terminals 17-18 on the MIO 501 I/O board can be re-configured. (Reference: Sections below).

Flushing Valve

A flushing valve can be used to clean the pump sump.

Before using this function

- Configure the RTU to use three pumps or less.
- This function requires that terminals 17-18 on the MIO 501 I/O board are connected to the flushing valve.

Function: Flushing valve

After a number of pump cycles, the flushing valve is opened a specified time.

Configure flushing valve

Select "Flushing valve" in the Function output 4 menu (17_7_1).

1. Specify the number of pump cycles between each flushing in the Flushing interval menu (13_17).
2. Specify how long time to flush in the Flushing time menu (13_18).

Disable flushing

Set Flushing time to "0".

General Output

Terminals 17-18 on the MIO 501 I/O board can be used as general output.

Before using this function

Configure the RTU to use three pumps or less.

Function: General output

The General output is affected by selected conditions. When:

- At least one condition is true, the output is active.
- All conditions are false, the output is passive.

Conditions that can affect a General output

Condition	Description
Power failure	There is a mains power failure.
High level	The sump level is high.
P1 failure	Pump 1 is blocked by a pump failure.
P1 blocked	Pump 1 is blocked.
..	..
P3 blocked	Pump 3 is blocked.

Pump failures

The following pump failures can block a pump:

- High temperature
- Tripped motor protection
- Exceeded max run time (results in a temporary block)

Configure the General output

1. Select "General output" in the Function output 4 menu (17_7_1).
2. Specify conditions in the Output. 4 config menu (17_7_2).
Select:
 - **1** to enable a condition.
 - **0** to disable a condition.

Reset Motor Protection

A tripped motor protection can be reset.

Before using this function

- Configure the RTU to use three pumps or less.
- This function requires that terminals 17-18 on the MIO 501 I/O board are connected to the reset input in the motor protection.

Type of reset

- RTU can try to reset the motor protection automatically, *or*
- Personnel can try to reset the motor protection manually.

Function: Automatic reset

1. RTU waits three minutes for the protection to cool.
2. RTU tries to reset the motor protection once. Result: The table shows possible results.

If reset...	Then...
is successful.	pump can now restart.

If reset...	Then...
is successful, but the motor protection is tripped again the following pump cycle.	no further reset attempts are made. Pump remains blocked.
fails.	pump remains blocked.

Configure motor protection reset

1. Select "Motorprotect. reset" in the Function output 4 menu (17_7_1).
2. In the Auto reset menu (16_3), select:
 - "Yes" to enable automatic reset.
 - "No" to disable automatic reset.

Extended Configuration

Trim Level Control

Pump Stop Delay

It may not be possible to install a level sensor or switches low enough in the sump. Thus, the sump is not emptied completely when the last running pump is stopped.

Function: Stop delay time

1. Sump level drops below the normal stop level for the last running pump.
Result: Timer is started.
2. Timer exceeds the stop delay time.
Result: The last running pump is stopped.

Configure stop delay

- To delay the pump stop, specify the time in the Stop delay time menu (13_5).
- To disable the stop delay, enter "0" as Stop delay time.

High Level Runtime

A high level switch is a backup used to start the pumps during a high sump level.

Before using this function

Configure a General purpose input as high level switch input.

Function: High level runtime

Phase	Description
1	Sump level exceeds the high level switch. Result: Available pumps are started. A high level alarm is generated.
2	Sump level drops below the high level switch. Result: Timer starts.
3	<div> <div> Timer exceeds the high level run time. Result: Pumps are stopped. </div> <div> The sump level drops below a low level switch. Result: <ul style="list-style-type: none"> • Pumps are stopped, • Remaining high level run time is skipped. </div> </div>

Specify high level runtime

Specify the runtime in the High level run time menu (13_15)

Configure Pump Control

EX-classified Environment

NOTICE:

This function should be enabled when the RTU is used in an EX-classified environment.

Function: EX-mode

When no liquid is detected in the sump, all pumps are blocked. The starting method will not matter, that is, any manual start attempt, maintenance run, or remote start command will be blocked.

Configure EX-mode

- To enable EX-mode, select "On" in the EX mode menu (16_2).
- To disable EX-mode, select "Off".

Related configuration

EX-mode affects General purpose inputs.

Trim Pump Control

Delay a Pump Start

The RTU can delay the start of a pump.

Type of start delay

Start delay	Condition	Delay for next pump
Minimum pump stop time	A pump has stopped.	5 seconds
Time between starts	A pump has started.	Configurable
Power failure	Power supply has been restored after a power failure.	10 seconds

Specify time between pump starts

Specify the time in the Time betw. starts, P1 – P4 menus (13_9 --13_12).

Limit Pump Operation

The RTU can limit:

- Number of pumps running at the same time.
- Maximum time any pump is allowed to run continuously.

Example: The maximum runtime is useful to stop a clogged pump from running too long.

Function: Maximum number of running pumps

When the maximum number of pumps are running at the same time, no idle pump is allowed to start.

Function: Maximum runtime

When a pump has run longer than the maximum run time:

- Pump is temporarily stopped.
- Maximum runtime alarm is generated.

Considerations: Maximum runtime

To avoid a flooded pump sump, the maximum runtime must exceed one pump cycle. Consider that the following can add time to a pump cycle:

- High level runtime. (Reference: see page14).
- Stop delay. (Reference: see page14).

Limit pump operation

1. Specify maximum number of running pumps in the Max. no. run. pumps menu (13_6).
2. Specify maximum runtime for pumps in the Max. run time menu (13_14).

Disable runtime limit

Set maximum runtime to "0".

Maintenance run

A pump that stands still for a long time can be run automatically with regular intervals. This is useful to keep the mechanical seals in the pump in shape.

Function: Maintenance run

When a pump has been standing still for a specified number of hours, the RTU starts the pump for a maintenance run.

Configure maintenance run

1. Specify the time between each maintenance run in the Auto start interval menu (13_13).
2. Specify the pump run time during a maintenance run in the Auto start time menu (13_14).

Disable maintenance run

Set auto start time to "0".

Operating Sequence

If a pump always start at the lowest sump level, this pump will normally run more than the other pumps.

Function: Pump alternation

- Pumps part of the alternation change start levels while standing still after a complete pump cycle.
- Pumps not part of the alternation always start at the same start level.

When a pump cannot start, the next alternating pump will start. Example: Pump is shut off or faults.

Number of alternating pumps

Number of alternating pumps	Alternates Pump 1?	Alternates Pump 2?	Alternates Pump 3?	Alternates Pump 4?
2	Yes	Yes	No	No
3	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes

Example: Three alternating pumps

The table shows when pumps start during different pump cycles:

Start level	Pump cycle 1	Pump cycle 2	Pump cycle 3
1	Pump 1	Pump 2	Pump 3
2	Pump 2	Pump 3	Pump 1
3	Pump 3	Pump 1	Pump 2
4	Pump 4	Pump 4	Pump 4

Example: Pump 2 faults with three alternating pumps

The table shows when pumps start if Pump 2 faults:

Start level	Pump cycle 1	Pump cycle 2	Pump cycle 3
1	Pump 1	Pump 3	Pump 1
2	Pump 3	Pump 1	Pump 3
3	No pump	No pump	No pump
4	Pump 4	Pump 4	Pump 4

Configure pump alternation

1. Select "On" in the Pump alternation menu (13_7).
2. Specify number of alternating pumps in the Alternating pumps menu (13_8).

Disable pump alternation

Set pump alternation to "Off".

Configure Extra Functions

Current Measurement

The RTU can measure pump currents.

Before using this function

This function requires that a current transformer is connected to the current transformer input. (Reference: Installation manual).

Types of currents

Each pump has its own current, but they are measured in pairs:

- Pump 1 and pump 3 currents
- Pump 2 and pump 4 currents

Function: Current alarm limits

When the current:

- Exceeds High current limit, a high current alarm is generated.
- Drops below Low current limit, a low current alarm is generated.

Current factor

If two currents in a measured pair have different maximum currents, it is necessary to specify the factor between them.

Example: Maximum current for pump 1 (5,5 A), is divided by the maximum current for pump 3 (8 A). The current factor is 0,63.

Configure current measurement:

1. Specify high current alarm limit for pump 1 in the P1 high current menu (3_1).
2. Specify low current alarm limit for pump 1 in the P1 low current menu (3_2).
3. Repeat Step 1-2 for each additional pump.
4. Specify the current transformer rating for pump 1/pump 3 in the P1/P3 Current range menu (3_3).
5. Specify the current factor between pump 1 and pump 3 in the Current factor P1/P3 menu (3_4).
Keep in mind: Only necessary when the maximum pump currents are different.
6. Repeat step 4-5 for the other pair of pumps.

Disable alarm limit

Set the alarm limit to "0".

Rain Measurement

The RTU can measure the rain fall based on pulses from a rain meter.

Before using this function

- Configure a General purpose input as rain meter input.
- Obtain scale factor for rain meter. (Reference: Rain meter documentation).

Function: Rain alarm limits

When the average rain fall during:

- 5 minutes exceeds its rain alarm limit, a high rain 5 min alarm is generated.
- 24 hours exceeds its rain alarm limit, a high rain 24 h alarm is generated.

Configure rain measurement:

1. Specify the scale factor for the rain meter in the Rain scale menu (9_3).
Example: if the rain meter is specified to give 1.2 mm/pulse, enter 1.2 as scale factor.
2. Specify the rain alarm limit for a 5 minute period in the Rain alarm 5min menu (9_1).
3. Specify the rain alarm limit for a 24 hour period in the Rain alarm 24h menu (9_2).

Configure Communication

Systems

Direct communication with the SCADA system

In this system the RTU communicates directly with the SCADA (central) system.

A modem, a radio or a signal cable is used for the transmission of information between the units in the system.

Either the factory settings or the first user profile of the modem (profile 0) can be used. In the first case no special configuration of the modem is required but in the second case the user profile has to be configured prior to use with the RTU.

Communication via MTC-COM

In this system the RTU communicates with the SCADA system, via the communication unit, MTC-COM.

A modem, a radio or a signal cable is used for the transmission of information between the units in the system.

Prior to use with the RTU the first user profile of the modem (profile 0) has to be configured.

NOTICE:

The factory settings of the modem cannot be used in this case.

Modems

Communication is possible using PSTN, GSM, GPRS, or radio modem.

The modem can either use factory settings or user profile 0, which must then be pre-configured.

Example: Configuring a TD-33 modem

To configure the modem:

1. Start Windows Hyperterminal program.
2. Select and configure the COM port to which the modem is connected:
 - Bits per second: 9600 (or another speed you want to use)
 - Data bits: 8
 - Parity: Use the same setting as in the modem (none, even, or odd).
 - Stop bits: 1
 - Flow control: Hardware
3. Type "AT&F" and press **Enter**. The modem will answer "OK".
4. Type in the initialization string: E.g. AT&F E0V0 &K3 &D2\N3 %E0 S36=3 S0=0 and press **Enter**.



NOTICE:

The initialization string must be permanently stored in the modem. Either:

- Append "&W" to the initialization string, *or*
 - Type "AT&W" after entering the initialization string.
-

Configuration

Fixed line FDX (Full Duplex)

Communication using a fixed line modem, radio modem, or directly to a PC.

Menu	Values	Description
Communication COM1 (15_10)	RS232 FDX	Normally, FDX can be used if the SCADA system has not specially been set-up to use HDX.
Speed COM1 (15_13)	1200-115200 bps	Set this value to the same as the port baudrate in the SCADA system.
Parity COM1 (15_14)	None, Even or Odd	Use the same setting as in the communication equipment.
Protocol COM1 (15_15)	AquaCom polled fixed Modbus fixed Comli fixed	
Max buffer size (15_24)	120-4000	If your radio has a limited buffer or there are disturbances decrease this value. e.g. 200.
Station number / id (15_1)	001-899	In the SCADA system, the station number is a unique number for the RTU. When fixed communication is used, the station number and fixed line id both have the same value in Aquaview.

Fixed line HDX (Half Duplex)

Communication using a fixed line modem, radio modem, or directly to a PC.

Menu	Values	Description
Communication COM1 (15_10)	RS232 HDX	Will work with normal settings in the SCADA system.
Speed COM1 (15_13)	1200-115200 bps	Set this value to the same as the port baudrate in the SCADA system.
Parity COM1 (15_14)	None, Even or Odd	Use the same setting as in the communication equipment.
Protocol COM1 (15_15)	AquaCom polled fixed Modbus fixed Comli fixed	
RTS delay COM1 (15_17)	25-1000 ms	Low delay means faster communication. Use higher value if required by the radio, i.e. if there are problems with the communication.
Max buffer size (15_24)	120-4000	If your radio has a limited buffer or there are disturbances decrease this value. e.g. 200.
Station number / id (15_1)	001-899	In the SCADA system, the station number is a unique number for the RTU. When fixed communication is used, the station number and fixed line id both have the same value in Aquaview.

GPRS modem

Communication using a GPRS modem

Menu	Values	Description
Communication COM1 (15_10)	GPRS	The RTU will make all necessary initialization of the modem. There is no need for any manual modem configuration.
Speed COM1 (15_13)	19200 bps	The default speed used by the modem after a power on reset. Make sure not to configure the modem using the "AT&F" command, since this will set the speed to 115200.
Parity COM1 (15_14)	None, Even or Odd	Use the same setting as in the communication equipment.
Protocol COM1 (15_15)	AquaCom unpolled fix	
CS IP address (15_18)		Enter the IP address to the SCADA system.
CS IP port (15_19)		Enter the IP port of the SCADA system.
Access point 1 (15_20)		Enter the access point name. It describes the telephone provider, for example internet.<some telephone company name>.net . If the name is longer than 20 characters, the name can be split in two. Enter the first piece in the Access point 1 menu, and the second piece in the Access point 2 menu.
Access point 2 (15_21)		
Station number / id (15_1)	001-899	In the SCADA system, the station number is a unique number for the RTU.

NOTICE:

If you connect a terminal to the service port in the RTU, you can specify the access point name with the command **setcomdata**.

Format: **setcomdata <access point name>**

Telephone modem

Communication using a Hayes compatible telephone modem, or GSM modem.
(Reference: Observe the limitations for combinations of modems and their configuration strings as described in the Modem Configuration manual).

Menu		Values	Description
Communication COM1	(15_10)	Hayes modem GSM/Hayes predef.	Select Hayes modem when using TD33 for communication directly to the SCADA system. In all other cases configure the modem using a PC and select GSM/Hayes predefined. Select this option if an MTC-COM is included in the system.
Speed COM1	(15_13)	1200-115200 bps	If your modem supports autobauding, set this as high as possible to get the best communication performances. Otherwise set this value to the same as the value used in the pre-configuration of the modem.
Parity COM1	(15_14)	None, Even or Odd	Use the same setting as in the communication equipment.

Menu		Values	Description
Protocol COM1	(15_15)	AquaCom dialled Modbus dialled Comli dialled	
Station number / id	(15_1)	001-899	In the SCADA system, the station number is a unique number for the RTU.
Telephone no. CS/SMS	(15_3)		Enter the telephone number to the SCADA system or MTC-COM.

GSM modem

Communication using a GSM or telephone modem. (Reference: Observe the limitations for combinations of modems and their configuration strings as described in the Modem Configuration manual).

Menu		Values	Description
Communication COM1	(15_10)	GSM/Hayes predef.	Configure the modem using a PC and select GSM/Hayes predefined.
Speed COM1	(15_13)	1200-115200 bps	If your modem supports autobauding, set this as high as possible to get the best communication performances. Otherwise set this value to the same as the value used in the pre-configuration of the modem.
Parity COM1	(15_14)	None, Even or Odd	Use the same setting as in the communication equipment.
Protocol COM1	(15_15)	AquaCom dialled Modbus dialled Comli dialled	
Station number / id	(15_1)	001-899	In the SCADA system, the station number is a unique number for the RTU.
Telephone no. CS/SMS	(15_3)		Enter the telephone number to the SMS recipient, i.e. the personnel.

User modem

Communication using a GSM modem or a telephone modem when you want the RTU to configure the modem. (Reference: Observe the limitations for combinations of modems and their configuration strings as described in the Modem Configuration manual).

Menu	Values	Description
Communication COM1 (15_10)	User modem	
Modem init 1 (15_11)		Enter the initialization string for the modem. The string can be split in two. Enter the first piece in the Modem init 1 menu, and the second piece in the Modem init 2 menu. Note! See "Systems" on page17.
Modem init 2 (15_12)		
Speed COM1 (15_13)	1200-115200 bps	If your modem supports autobauding, set this as high as possible to get the best communication performances. Otherwise set this value to the same as the value used in the initialization string for the modem.

Menu	Values	Description
Parity COM1 (15_14)	None, Even or Odd	Use the same setting as in the communication equipment.
Protocol COM1 (15_15)	AquaCom dialled Modbus dialled Comli dialled	
Station number / id (15_1)	001-899	In the SCADA system, the station number is a unique number for the RTU.
Telephone no. CS/SMS (15_3)		Enter the telephone number to the SCADA system or MTC-COM.

NOTICE:

If you connect a terminal to the service port in the RTU, you can specify the modem initialization with the command **setcomdata**.

Format: **setcomdata <modem init>**

GSM modem and SMS

Communication using a GSM modem. The RTU can be monitored by the SCADA system in this configuration. However, alarms are sent directly to cell phones as SMS. (Reference: Observe the limitations for combinations of modems and their configuration strings as described in the Modem Configuration manual).

Menu	Values	Description
Communication COM1 (15_10)	GSM/Hayes predef.	Configure the modem using a PC and select GSM/Hayes predefined.
Speed COM1 (15_13)	1200-115200 bps	If your modem supports autobauding, set this as high as possible to get the best communication performances. Otherwise set this value to the same as the value used in the pre-configuration of the modem.
Parity COM1 (15_14)	None, Even or Odd	Use the same setting as in the communication equipment.
Protocol COM1 (15_15)	AquaCom/SMS	
Station name (15_2)		Enter a name that will be sent in the SMS alarm message.
Telephone no. CS/SMS (15_3)		Enter the first telephone number to the SMS recipient, i.e. the personnel.
Telephone no. SMS 2 (15_4)		Telephone number to SMS receiver. The telephone number is required for alarm handling to more than one SMS receiver. Only applicable when alarm handling using SMS is selected.
..		..
Telephone no. SMS 5 (15_7)		Telephone number to SMS receiver. The telephone number is required for alarm handling to more than one SMS receiver. Only applicable when alarm handling using SMS is selected.

Configure Alarm Handling

About Alarms

When an alarm is generated, the alarm is:

- Indicated on the RTU front panel, *and*
- Listed in the RTU alarm log.

If the RTU is equipped for communication, the alarm is sent to:

- SCADA system, *or*
- SMS receivers.

General

Alarm Delay

Alarm generation can be delayed.

Before using this function

To delay a mains error alarm, the RTU has to be connected to a 24 V battery backup that can supply the RTU during the delay time.

Restriction: Mains power failure

- The pumps are blocked directly at mains power failure. This block is not delayed.
- The maximum delay for a mains error alarm is 960 minutes.

Function: Alarm delay

When the alarm condition is fulfilled longer time than the alarm delay, the alarm is generated.

Configure alarm delays

1. Specify general delay in the General alarm delay menu (14_1).
2. Specify delays for:
 - Mains error alarms in the Pow.fail alarm delay menu (14_2).
 - Low level alarms in the Low level alarm delay menu (14_3).
 - Blocking alarms in the Blocking alarm delay menu (14_4).

Alarm Priority

The alarm priority determines what happens with the alarm.

Function: Alarm priorities

Priority	Description
A	Alarm is sent to: SCADA system, <i>or</i> SMS receivers
B	Same as for priority A.
C	Alarm is only local in the RTU.
D	Alarm is sent to: SCADA system according to its D-alarm time frame, <i>or</i> SMS receivers according to the D-alarm time frame in the RTU.
F	Alarm is not recorded.
H	For future use.

Configure alarm priorities

Select priorities in the Alarm priority 1-4 menus (14_11 – 14_14).

Alarm Texts and Alarm Codes for External Alarms

Alarm texts for external alarms are used in:

- RTU alarm log, *and*
- Alarms sent to SMS receivers.

Alarm codes for external alarms are only used when alarms are sent to a SCADA system.

Before using this function

Configure General purpose inputs as external alarm inputs.

Considerations: Alarm texts

- Extended ASCII characters can be used. Example: öøé.
- If the first character is left blank, the standard alarm text is used. Example: "Alarm Input 1".

Function: Alarm codes

1. An alarm is sent to the SCADA system. The alarm contains an alarm code.
2. SCADA system uses the alarm text that corresponds to the alarm code.

Keep in mind: Alarm texts in the SCADA system may differ from the alarm texts in the RTU.

Configure alarm texts

1. Specify alarm texts in the Alarm text input 1-8 menus (14_15_1 –14_15_8).
2. Specify alarm code in the Alarm code input 1-8 menus (14_16_1 –14_16_8).

Keep in mind: Only relevant when alarms are sent to a SCADA system.

Alarms Sent to SCADA System

The RTU can send alarms to a SCADA system.

Function: Sending fails

Phase	Description
1	RTU sends an alarm to the SCADA system.
2	Result: Sending fails. Example: SCADA system is busy or do not reply.
3	RTU waits one minute before the next attempt.
4	After each successive failure, the RTU waits one minute longer than before until 10 attempts have failed.
5	The RTU waits three hours before recommencing the dialing sequence.

Alarms Sent to SMS Receivers

Alarm Acknowledgement

The RTU can send SMS with alarms to one recipient at a time or to all at once.

Function: Alarm acknowledgement time

Phase	Description
1	RTU sends an SMS with an alarm to a recipient.
2	Result: RTU receives an acknowledgement within specified time. Result: RTU receives no acknowledgement within specified time.

Phase	Description	
3	No more SMS are sent.	RTU tries to send the SMS to the next recipient.

NOTICE:

If all numbers have been dialled, but no alarm acknowledgement has been received, the specific alarm will not be sent again.

Function: No alarm acknowledgement time

When the acknowledge request is disabled, SMS alarms are sent to all listed phone numbers.

Configure SMS alarm acknowledgement

- Specify acknowledgement time in the SMS Acknowledge time menu (15_8).
- To disable acknowledge requests, set acknowledgement time to "0".

Passive Alarms

When alarms become passive, SMS can be sent out.

Specify passive alarm handling

- To send out SMS with passive alarms, select "Yes" in the SMS P-alarm menu (15_9).
- To disable SMS with passive alarms, select "No".

Time Frame for Sending D-alarms**Function: D-alarm time frame**

SMS with D-alarms are sent only during a specified time frame. If the alarm occurs at any other time, the RTU will wait until the D-alarm time frame begins and then send the alarm.

Function: No D-alarm time frame

If the D-alarm time frame is disabled, D-alarms are treated as A-alarms.

Configure time frame

1. Specify when to start sending SMS in the D-alarm start time menu (14_9).
2. Specify when to stop sending SMS in the D-alarm end time menu (14_10).

Disable time frame

Set both start and end times to "0".

Special Alarms

Personnel Alarm

The personnel alarm is used when work of any kind is carried out in a pump station, and alerts to the risk that an accident may occur.

Before using this function

Configure a General purpose input as personnel alarm input.

Restriction**NOTICE:**

The personnel alarm always has alarm priority **A** and cannot be prevented from being sent.

Function: Personnel alarm

Phase	Description	
1	The input is activated by a selector switch, usually a light switch in the pump station. Result: Work time begins.	
2	The input has been activated longer than the Work time. Result: Common alarm outputs are activated. Warning time begins.	
3	Personnel acknowledge their presence within the Warning time. Result: <ul style="list-style-type: none">• Work time is restarted.• Common alarm outputs are set to passive.	No acknowledge is received within the Warning time. Result: Personnel alarm is generated.

Configure the personnel alarm:

1. Enter a time in the Work time menu (14_5).
2. Enter a time in the Warning time menu (14_6).

Measure Flow Rate and Capacity

Estimate Pump Capacity

The RTU can estimate the pump capacity. This estimation is useful since capacity changes may indicate pump problems, such as a clogged pump.

Before using this function

- Obtain data on nominal capacities for all pumps. (Reference: Pump documentation).

Restriction

The pump capacity can only be estimated under certain circumstances. Thus it may take a while for the estimations to be updated.

Types of capacities

Capacity	Description
Nominal capacity	The flow a pump is designed to handle.
Calculated capacity	Pump capacity can diverge from the nominal capacity. Over time, the RTU can estimate the pump capacity.
Capacity divergence	How much the calculated capacity is allowed to diverge from the nominal capacity.
Upper/Lower level capacities	Pump capacity is estimated between these two limits.

Function: Calculated capacity

When the calculated capacity:

- Exceeds nominal capacity + capacity divergence, a high capacity alarm is generated.
- Drops below nominal capacity - capacity divergence, a low capacity alarm is generated.

Configure capacity calculations

1. Specify a sump level in the Upper level capacity menu (12_5_1).
Keep in mind. Enter a level below the lowest pump start level.
2. Specify a sump level in the Lower level capacity menu (12_5_2).
Keep in mind. Enter a level above the highest pump stop level, and below the upper level capacity.
3. Specify nominal capacity for pump 1 in the Nominal capacity P1 menu (12_1_1).
4. Specify capacity divergence for pump 1 in the Capacity div. P1 menu (12_1_2).
5. Repeat step 3-4 for any other pump.
6. Specify sump area in the Area menu (11_1).

Disable capacity calculations

Set both upper and lower level capacities to "0".

Estimate Overflow Flow and Volume

The RTU can estimate the overflow flow and volume.

Before configuring the function

Optionally, configure a General purpose input as overflow input.

Types of overflow monitoring

Overflow calculations starts when:

- Overflow activates the overflow sensor, *or*
- Sump level exceeds a specified overflow level.

Keep in mind: Overflow level is only relevant if an analogue level sensor is used.

Types of weir

Overflow calculations are based on:

- Rectangular spillway,
- V-shaped spillway, *or*
- Any type of spillway where the overflow flows are known for 2-10 sump levels.

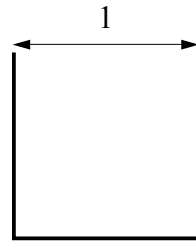
Disable overflow calculations

Select "No" in the Weir select menu (8_1).

Details: Rectangular Weir

(Reference for general information and requirements: "Estimate Overflow Flow and Volume").

Illustration: Rectangular spillway



1. Weir width

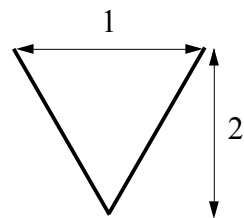
Configure rectangular weir

1. Select "Rectangular" in the Weir select menu (8_1).
2. Specify a sump level in the Overflow level menu (8_2).
Keep in mind. Enter "0" to only use the overflow sensor to trigger calculations.
3. Specify the weir discharge coefficient in the Discharge coeff. menu (8_3).
Reference: Spillway supplier. Example: A typical value is 0.62.
4. Specify a width in the Weir width menu (8_5).

Details: V-shaped Weir

(Reference for general information and requirements: "Estimate Overflow Flow and Volume").

Illustration: V-shaped spillway



1. Weir width
2. Overflow range

Configure v-shaped spillway

1. Select "V-notch" in the Weir select menu (8_1).
2. Specify a sump level in the Overflow level menu (8_2).
Keep in mind. Enter "0" to only use the overflow sensor to trigger calculations.
3. Specify the weir discharge coefficient in the Discharge coeff. menu (8_3).
Reference: Spillway supplier. Example. A typical value is 0.58.
4. Specify a range in the Overflow range menu (8_4)
5. Specify a width in the Weir width menu (8_5).

Details: Any Weir with 2-10 Known Overflow Flows

(Reference for general information and requirements: "Estimate Overflow Flow and Volume").

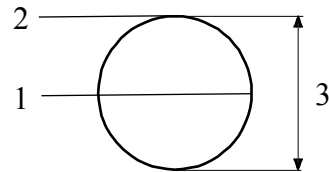
Considerations

For accurate estimations:

- Levels should be uniformly distributed within the overflow range.
- Top-most level should be the maximum overflow flow.
- The more known overflow flows, the greater the accuracy.

Example: Two known overflow flows

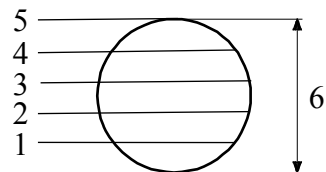
- Overflow 2 are the flow at top of the overflow range.
- Overflow 1 are the flow at 1/2 of the overflow range.



1. Overflow 1: 72.6 l/s
2. Overflow 2: 138.6 l/s
3. Overflow range

Example: Five known overflow flows

- Overflow 5 are the flow at top of the overflow range.
- Overflow 4 are the flow at 4/5 of the overflow range.
- ...
- Overflow 1 are the flow at 1/5 of the overflow range.



1. Overflow 1: 13.8 l/s
2. Overflow 2: 38.6 l/s
3. Overflow 3: 94 l/s
4. Overflow 4: 128.2 l/s
5. Overflow 5: 138.6 l/s
6. Overflow range

Specify a weir manually

1. Select "Manual" in the Weir select menu (8_1).
2. Specify a sump level in the Overflow level menu (8_2).
Keep in mind. Enter "0" to only use the overflow sensor to trigger calculations.
3. Specify a range in the Overflow range menu (8_4).
4. Specify overflow 1 in the Overflow segment 1 menu (8_6).
5. Repeat Step 4 for any other known overflow flow.
Keep in mind. Enter "0" not to use a level.

Read Operational Data

Read Operational Data

Available Functions

Functions that may be available are described below. Whether a function is available or not, depends on previous installation and configuration.

Menus to use

Menu name	No.	Description	Comment	Value can be reset?
Level	2_	Sump level		No
P1 current - P4 current	3_ - 6_	Current for Pump 1-4.		No
P1 start counter	7_1	Total number of starts for pump 1.		Yes
P1 run hour	7_2	Total runtime for pump 1.		Yes
..		..		
P4 run hour	7_8	Total runtime for pump 4.		Yes
Overflow flow	8_16	Estimated overflow flow.		No
Overflow volume	8_17	Estimated overflow volume.		Yes
Overflow count	8_18	Number of overflows		Yes
No. of major overfl.	8_19	Number of major overflows	An overflow is also a major overflow when no other overflow has occurred for the last 24 hours.	Yes
Overflow time	8_20	Total overflow time		Yes
Rain	9_	Daily rain value		No
Free flow	10_1	Estimated free flow.	The free flow is also called the inflow, and is the flow into the sump.	No
Pumped volume	10_2	Estimated volume pumped away from sump.		Yes
Sump volume	10_3	Estimated volume remaining in sump.		Yes
Calc. capacity P1 - P4	12_1 - 12_4	Capacity for Pump 1-4.		No

Reset operational data

1. View the relevant operation menu.
Example: P1 start counter menu.
2. Press OK.
Result: Menu window shows "Reset value? No".

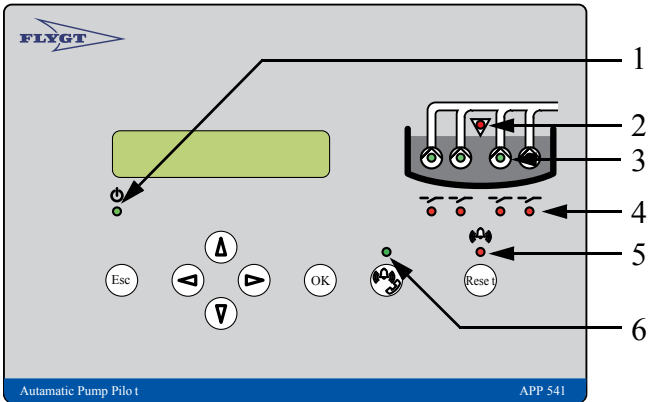
3. Press the Up arrow.
Result: Menu window shows "Reset value? Yes".
4. Press OK.
Result: Data is reset.

Monitor Status and Alarms

Monitor Status on Front Panel

The status is shown with LEDS on the RTU front panel.










Illustration: LEDs on the front panel



1. Power LED
2. High level LED
3. Pump status LED
4. Relay status LED
5. Alarm status LED
6. Communication LED

Monitor Status

LED	Description	Comments
 Green	Power supply is on.	
 Off		Possible causes: Power supply is off Fuse is blown.
 Red	Sump level is high.	Sump level exceeds: High level switch, <i>or</i> High level alarm limit for analogue sensor
 Green	There is feedback from the pump relay.	The pump is running.
 Red	There is a pump fault.	Possible causes: High temperature in pump Motor protection has tripped.

LED	Description	Comments
 Green	RTU has set the pump to run.	The pump relay is activated.
 Flashing red	Pump is blocked.	Possible causes: 230 V mains power failure Pump start is delayed after a power failure.
 Red	Pump is blocked.	Possible causes: External blocking signal is active. External Manual-0-Auto switch is set to blocked. (Ex-classified environment) No liquid is detect in the sump. Remote block from SCADA system. Sump level is low.
 Flashing red	New alarm has occurred.	The alarm is not acknowledged.
 	An alarm remains active.	The alarm is acknowledged.
 Off	No active alarms	
 Flashing green	An alarm is being sent to: SCADA system, <i>or</i> SMS receivers.	
 Green	RTU is set to send alarms to: SCADA system, <i>or</i> SMS receivers.	
 Off	No alarm is sent outside the RTU.	

Monitor Alarms in the RTU

Acknowledge/Silence an Alarm

When a new alarm is generated, the common alarm output may be turned on. Example:

- Siren
- Lamp

When the alarm is acknowledged, the output is silenced as well. The alarm is not removed from the alarm log.

Acknowledge a new alarm

Press Reset.

Monitor and Erase Alarms in the Alarm Log

The last 100 alarms are listed in the Alarm log.

Restriction

Only passive alarms can be deleted from the Alarm log.

Example: Mains error alarm has become passive

Text in alarm log: "Mains error 09/12/07 6:45A PB"

Structure: Alarm in alarm log

Field	Text in example	Comment
Alarm text	Mains error	
Date	6:45A	
Time	06:45	Legend: • A is AM • P is PM
Alarm type	P	Legend: (A) is active alarm (P) is passive alarm
Alarm priority	B	A, B, C or D

Open the alarm log

1. Display the Alarm log menu (1).
Result: The number of alarms in the alarm log are also shown in the menu window.
2. Press OK.
Result: The first alarm is displayed in the menu window.

Navigate the Alarm log

Press the Up or Down arrow.

Delete alarms

1. When an alarm is displayed in the menu window, press OK.
Result: The text "Delete alarm?" is displayed.
2. Press the Up or Down arrow to select either:
 - "Current" - only the current alarm will be deleted.
 - "All" - all alarms will be deleted.
3. Press OK.
Result: The text "Log cleared" is displayed.

Close the Alarm log

Press Esc.

Disable Alarms Temporarily

When working in a pump station, you can temporarily prevent new alarms from being sent.
Example: Avoid false alarms during sump cleaning.

Function: Remote alarm handling

Alarm handling	Description
Local	New alarms are not sent, but buffered in the RTU.
Clear (buffer)	The following takes place: <ol style="list-style-type: none"> 1. Alarm buffer is cleared. 2. Alarm handling is set to Remote.
Remote	Any alarm is sent.

Temporarily disable sending alarms

1. Select "Local" in the Transmit alarm menu (14_7).
2. When ready, set Transmit alarm to:
 - "Clear", *or*
 - "Remote"

Monitor Alarms Sent as SMS

The RTU can send alarms to SMS receivers.

Example: Mains error alarm has become passive

SMS text: 1 - Elm St. PS 14 2007-09-12 06:45 B Mains error (P)

Structure: Alarm sent as SMS

Field	Text in example	Comment
Station number	1	
Station name	Elm St. PS 14	
Date	2007-09-12	
Time	06:45	
Alarm priority	B	
Alarm text	Mains error	
Alarm type	(P)	Legend: (A) is active alarm (P) is passive alarm

Acknowledge alarm

- Make a telephone call to the RTU, *or*
 - Reply to the SMS
- Keep in mind: No text is required.

Special Alarms

Acknowledge Presence

The personnel alarm function is activated by a selector switch, usually a light switch in the pump station.

Function: Personnel alarm

When the alarm indications are turned on, you have to acknowledge your presence within a Warning time.

Acknowledge presence

- Press Reset on the RTU front panel, *or*
- Flip the selector switch twice.

Example: Switch the lights off and on.

Motor Protection

You can try to reset a tripped motor protection manually.

Reset motor protection manually

- Press Reset on the RTU front panel, *or*
- Use remote control from the SCADA system.

Keep in mind: Reset can only be done when the pumps are stopped.

Miscellaneous

Change Between Automatic, Manual and Blocked Mode

Normally, the RTU controls the pumps.

Function: Manual control

You can override the automatic control, and manually:

- Block a pump, *or*
- Start and run a pump.

When ready, you can return control to the RTU.

Types of manual control

You can control a pump manually with:

- Menu in the RTU, *or*
- External switch used to switch between automatic, manual and blocked mode (if installed).

Example: Manual-0-Auto switch.

Menus to use

P1 state - P4 state menus (13_1 - 13_4)

Change pump state

To block a pump manually:

- Set the pump state to "Blocked", *or*
- Set the switch to blocked mode.

To start and run a pump manually:

- Set the pump state to "Manual", *or*
- Set the switch to manual mode.

To return control to the RTU:

1. Set the pump state to "Auto", *and*
2. Set the switch to automatic mode.

Troubleshooting

Types of troubleshooting

- View status of digital inputs.
- Invert digital inputs from normally open to normally closed, or vice versa.
- Run diagnostic program
- Reset RTU default settings.

Exception: MAC-address remains the same.

Function: Diagnostic program

- When a program is run, normal pump control operation is deactivated.
- After 10 minutes the RTU will automatically revert to normal operation.

Menu value	Function	Result
Off	None	The RTU is in normal operation.
10	Digital inputs	The states of the digital inputs are displayede.g. 1001100100000000
11	LED output Common alarm output	Flashes at 1 second interval.

Menu value	Function	Result
20	Analogue input	Shows the raw input values (0-16383).
24	P1 current input	Shows the raw input values (0-16383). This starts P1.
25	P2 current input	Shows the raw input values (0-16383). This starts P2.

View status of digital inputs

View the Status inputs menu (17_2):

- 0 = passive
- 1 = active

Invert inputs

For an input in the Invert inputs menu (17_3), select:

- "1" to invert the input.
- "0" for no inversion. (Default state).

Run a diagnostic program

Select the program in the Diagnostic program menu (17_8).

Reset RTU to default settings

1. Select "Yes" in the Flygt default menu (17_9).
Result: RTU restarts, and the text "Restart" is shown in the display.
2. Wait until the restart is complete, and the text have disappeared.

Appendix A: RTU Descriptions

List of Alarms

Alarm Code	Default priority	Local text	SCADA System Text	Description
1	A	High level	High level	High level in pump sump. Alarm from the level sensor.
2	C	Low level	Low level	Low level in pump sump. Alarm from the level sensor.
3	B	Mains error	Mains error	The main power has been disrupted or the phase sequence is incorrect or one phase is missing.
4	A	High level float	High level float	The level in the sump reaches the high level switch. The pumps will be started.
5	A	Pers. alarm	Personal alarm	Personal alarm warning time has run out without reset. Personnel in danger!
11	B	Tripped motor P1	Tripped motor protector P1	The Pump 1 has a tripped motor protection. The pump is blocked by this alarm.
12	B	Tripped motor P2	Tripped motor protector P2	The Pump 2 has a tripped motor protection. The pump is blocked by this alarm.
13	B	Tripped motor P3	Tripped motor protector P3	The Pump 3 has a tripped motor protection. The pump is blocked by this alarm.
14	B	Tripped motor P4	Tripped motor protector P4	The Pump 4 has a tripped motor protection. The pump is blocked by this alarm.
15	B	High current P1	High current P1	High current pump 1. Alarm from the analogue current measurement.
16	C	Low current P1	Low current P1	Low current pump 1. Alarm from the analogue current measurement.
17	B	High current P2	High current P2	High current pump 2. Alarm from the analogue current measurement.
18	C	Low current P2	Low current P2	Low current pump 2. Alarm from the analogue current measurement.
19	B	High current P3	High current P3	High current pump 3. Alarm from the analogue current measurement.
20	B	Low current P3	Low current P3	Low current pump 3. Alarm from the analogue current measurement.
21	B	High current P4	High current P4	High current pump 4. Alarm from the analogue current measurement.
22	B	Low current P4	Low current P4	Low current pump 4. Alarm from the analogue current measurement.
27	C	Setpoint changed	Setpoint changed	At least one menu has been changed on the local display. The alarm reverts when new set points are sent to the RTU.
30	C	No response P1	No response P1	There is no response signal from pump 1. The pump has probably not started despite activation of the power relay.
31	C	No response P2	No response P2	There is no response signal from pump 2. The pump has probably not started despite activation of the power relay.
32	B	No response P3	No response P3	There is no response signal from pump 3. The pump has probably not started despite activation of the power relay.

Alarm Code	Default priority	Local text	SCADA System Text	Description
33	B	No response P4	No response P4	There is no response signal from pump 4. The pump has probably not started despite activation of the power relay.
34	A	Overflow	Overflow	Overflowing. The station is now overflowing.
35	A	High temp. P1	High temperature P1	High temperature in pump 1.
36	A	High temp. P2	High temperature P2	High temperature in pump 2.
37	B	High temp. P3	High temperature P3	High temperature in pump 3.
38	B	High temp. P4	High temperature P4	High temperature in pump 4.
40	C	Low level float	Low level float	Low level float. The pumps will be stopped.
41	C	Invalid setpoints	Invalid setpoints	The level setpoints are incorrect. The specified setpoints for Start, Stop or High level is either outside the calibration range or they are mutually not corresponding, i.e. the high level setpoint is lower than the start level setpoint.
81	C	Alarm input 1	Alarm digital input 1	Alarm from digital input 1. The alarm is user defined.
82	C	Alarm input 2	Alarm digital input 2	Alarm from digital input 2. The alarm is user defined.
83	C	Alarm input 3	Alarm digital input 3	Alarm from digital input 3. The alarm is user defined.
84	C	Alarm input 4	Alarm digital input 4	Alarm from digital input 4. The alarm is user defined.
85	C	Alarm input 5	Alarm digital input 5	Alarm from digital input 5. The alarm is user defined.
86	C	Alarm input 6	Alarm digital input 6	Alarm from digital input 6. The alarm is user defined.
87	C	Alarm input 7	Alarm digital input 7	Alarm from digital input 7. The alarm is user defined.
88	B	Alarm input 8	Alarm digital input 8	Alarm from digital input 8. The alarm is user defined.
8214	B	Low 24V Supply	Low 24V external supply	Low 24V supply.
8378	A	Blocked	Blocked	All the pumps have been blocked.
8460	C	P1 Spare alarm	P1 Spare alarm	P1 spare alarm.
8461	C	P2 Spare alarm	P2 Spare alarm	P2 spare alarm.
8462	B	P3 Spare alarm	P3 Spare alarm	P3 spare alarm.
8463	B	P4 Spare alarm	P4 Spare alarm	P4 spare alarm.
8484	B	P1 max run time	P1 max run time	The pump 1 has exceeded the maximum allowed run time. The pump is blocked by this alarm. See also the Max run time set-point.
8485	B	P2 max run time	P2 max run time	The pump 2 has exceeded the maximum allowed run time. See also the Max run time set-point.
8486	B	P3 max run time	P3 max run time	The pump 3 has exceeded the maximum allowed run time. The pump is blocked by this alarm. See also the Max run time set-point.
8487	B	P4 max run time	P4 max run time	The pump 4 has exceeded the maximum allowed run time. The pump is blocked by this alarm. See also the Max run time set-point.
8505	C	Sensor Fault	Sensor Fault	An error in the analogue sensor has been detected. The measured level is outside the sensor range.

Alarm Code	Default priority	Local text	SCADA System Text	Description
8510	B	High capacity P1	High capacity P1	The RTU has calculated a capacity higher than the high capacity alarm level for pump 1.
8511	B	High capacity P2	High capacity P2	The RTU has calculated a capacity higher than the high capacity alarm level for pump 2.
8512	B	High capacity P3	High capacity P3	The RTU has calculated a capacity higher than the high capacity alarm level for pump 3.
8513	B	High capacity P4	High capacity P4	The RTU has calculated a capacity higher than the high capacity alarm level for pump 4.
8514	B	Low capacity P1	Low capacity P1	The RTU has calculated a capacity lower than the low capacity alarm level for pump 1.
8515	B	Low capacity P2	Low capacity P2	The RTU has calculated a capacity lower than the low capacity alarm level for pump 2.
8516	B	Low capacity P3	Low capacity P3	The RTU has calculated a capacity lower than the low capacity alarm level for pump 3.
8517	B	Low capacity P4	Low capacity P4	The RTU has calculated a capacity lower than the low capacity alarm level for pump 4.
8538	B	I/O-mod not resp	I/O-module(s) not responding	Communication problem with I/O-module. The I/O-module is not responding.
8539	C	Wrong I/O-module	Wrong type of I/O-module	Communication problems with I/O units. Wrong unit type.
8602	B	High level +pfail	High level +pumpfailure	The level is high and in the same time there is a failure on at least one pump
8606	B	P1 switched off	P1 switched off	Pump 1 is switched off. i.e. not in auto mode
8607	B	P2 switched off	P2 switched off	Pump 2 is switched off. i.e. not in auto mode
8608	B	P3 switched off	P3 switched off	Pump 3 is switched off. i.e. not in auto mode
8609	B	P4 switched off	P4 switched off	Pump 4 is switched off. i.e. not in auto mode
8615	B	Failure 2 pumps	Failure on two pumps	There are failures on 2 or more pumps
8630	B	Testcall !	Testcall !	A test alarm is sent in order to verify that the RTU and its communication are working properly. The alarm is sent at a regular interval, which is configurable.
8652	C	High rain 5 min	High rainfall 5 min	The RTU has calculated a rainfall higher than the rain alarm limit for 5 minutes.
8653	C	High rain 24 h	High rainfall 24 h	The RTU has calculated a rainfall higher than the rain alarm limit for 24 hours.

List of Menus

No.	Menu name	Specification	Description
1	Alarm log	Writable	Alarm log.
2	Level ft	Read only	Level indication.

No.	Menu name	Specification	Description
2_1	Start level 1 ft	WritableCentral System Text Start level 1 (ft)	Start level for first pump.
2_2	Stop level 1 ft	WritableCentral System Text Stop level 1 (ft)	Stop level for first pump.
2_3	Start level 2 ft	WritableCentral System Text Start level 2 (ft)	Start level for second pump.
2_4	Stop level 2 ft	WritableCentral System Text Stop level 2 (ft)	Stop level for second pump.
2_5	Start level 3ft	WritableCentral System Text Start level 3 (ft)	Start level for third pump.
2_6	Stop level 3 ft	WritableCentral System Text Stop level 3 (ft)	Stop level for third pump.
2_7	Start level 4 ft	WritableCentral System Text Start level 4 (ft)	Start level for fourth pump.
2_8	Stop level 4 ft	WritableCentral System Text Stop level 4 (ft)	Stop level for fourth pump.
2_9	High level ft	WritableCentral System Text High level (ft)	High level alarm limit.
2_10	Low level ft	WritableCentral System Text Low level (ft)	Low level alarm limit.0 - disables the function
2_11	Random start range ft	WritableCentral System Text Random start range (ft)	Random start range
2_12	Sensor range ft	WritableCentral System Text Sensor range (ft)	Sensor range.
2_13	Sensor calibration ft	WritableCentral System Text Sensor calibration (ft)	Sensor calibration offset.
3	P1 current A	Read only	Measured current for first pump.
3_1	P1 high current A	WritableCentral System Text P1 high current (A)	High current alarm limit for first pump.
3_2	P1 low current A	WritableCentral System Text P1 low current (A)	Low current alarm limit for first pump.
3_3	P1/P3 Current range A	Writable	Current transformer range for pump 1
3_4	Current factor P1/P3	Writable	Current factor for P1 versus P3. Used when P1 and P3 are difference sizes. Default is 1.0
4	P2 Current A	Read only	Measured current for second pump.
4_1	P2 high current A	WritableCentral System Text P2 high current (A)	High current alarm limit for second pump.
4_2	P2 low current A	WritableCentral System Text P2 low current (A)	Low current alarm limit for second pump.
4_3	Current range P2/P4 A	Writable	Current transformer range for pump 2 and 4

No.	Menu name	Specification	Description
4_4	Current factor P2/P4	Writable	Current factor for P2 and P4. Used when P2 and P4 are difference sizes. Default is 1.0
5	P3 current A	Read only	Measured current for pump 3.
5_1	P3 high current A	WritableCentral System Text P3 high current (A)	High current alarm limit for pump 3.
5_2	P3 low current A	WritableCentral System Text P3 low current (A)	Low current alarm limit for pump 3.
6	P4 current A	Read only	Measured current for pump 4.
6_1	P4 high current A	WritableCentral System Text P4 high current (A)	High current alarm limit for pump 4.
6_2	P4 low current A	WritableCentral System Text P4 low current (A)	Low current alarm limit for pump 4.
7	Operating data	Read only	Menu group for operating data
7_1	P1 start counter	Writable	Number of start for first pump.
7_2	P1 run hour h:min	Writable	Run hour for first pump.
7_3	P2 start counter	Writable	Number of starts for second pump.
7_4	P2 run hour h:min	Writable	Run hour for second pump.
7_5	P3 start counter	Writable	Number of start for third pump.
7_6	P3 run hour h:min	Writable	Run hour for third pump.
7_7	P4 start counter	Writable	Number of start for fourth pump.
7_8	P4 run hour h:min	Writable	Run hour for fourth pump.
8	Overflow...	Read only	Menu group for overflow
8_1	Weir select	Writable Alternative 0 = No1 = Rectangular 2 = V-notch3 = Manual Central System Text Weir select	Chose between different weir types:(0 = No, 1 = Rectangular, 2 = V-Notch and 3 = Manual)
8_2	Overflow level ft	WritableCentral System Text Overflow level (ft)	Overflow level alarm limit.0 - disables the function
8_3	Discharge coeff.	WritableCentral System Text Discharge coefficient	Discharge coefficient used by the rectangular and v-notch calculation method to calculate overflow flow and overflow volume.
8_4	Overflow range ft	WritableCentral System Text Overflow range (ft)	Overflow range (in ft) used by the v-notch and manual calculation method to calculate overflow flow and overflow volume. NOTE! This is the maximum overflow level relative to the overflow zero level.
8_5	Weir width ft	WritableCentral System Text Weir width (ft)	Weir width (in ft) used by the rectangular and v-notch calculation method to calculate overflow flow and overflow volume.
8_6	Overflow segment 1 GPM	WritableCentral System Text Overflow segment 1 (GPM)	Overflow segment 1 used by the manual calculation method to calculate overflow flow and overflow volume.
8_7	Overflow segment 2 GPM	WritableCentral System Text Overflow segment 2 (GPM)	Overflow segment 2 used by the manual calculation method to calculate overflow flow and overflow volume.
8_8	Overflow segment 3 GPM	WritableCentral System Text Overflow segment 3 (GPM)	Overflow segment 3 used by the manual calculation method to calculate overflow flow and overflow volume.

No.	Menu name	Specification	Description
8_9	Overflow segment 4 GPM	WritableCentral System Text Overflow segment 4 (GPM)	Overflow segment 4 used by the manual calculation method to calculate overflow flow and overflow volume.
8_10	Overflow segment 5 GPM	WritableCentral System Text Overflow segment 5 (GPM)	Overflow segment 5 used by the manual calculation method to calculate overflow flow and overflow volume.
8_11	Overflow segment 6 GPM	WritableCentral System Text Overflow segment 6 (GPM)	Overflow segment 6 used by the manual calculation method to calculate overflow flow and overflow volume.
8_12	Overflow segment 7 GPM	WritableCentral System Text Overflow segment 7 (GPM)	Overflow segment 7 used by the manual calculation method to calculate overflow flow and overflow volume.
8_13	Overflow segment 8 GPM	WritableCentral System Text Overflow segment 8 (GPM)	Overflow segment 8 used by the manual calculation method to calculate overflow flow and overflow volume.
8_14	Overflow segment 9 GPM	WritableCentral System Text Overflow segment 9 (GPM)	Overflow segment 9 used by the manual calculation method to calculate overflow flow and overflow volume.
8_15	Overflow segment 10 GPM	WritableCentral System Text Overflow segment 10 (GPM)	Overflow segment 10 used by the manual calculation method to calculate overflow flow and overflow volume.
8_16	Overflow flow GPM	Read only	Overflow flow
8_17	Overflow volume gal	Read only	Overflow volume
8_18	Overflow count	Writable	Number of overflows.
8_19	No. of major overfl.	Writable	No. of major overfl.
8_20	Overflow time h:min	Writable	Overflow time.
9	Rain inch	Writable	Rain daily value.
9_1	Rain alarm 5min inch/5min	Writable	Rain limit for 5 minute period.
9_2	Rain alarm 24h inch/24h	Writable	Rain alarm limit for 24 hours.
9_3	Rain scale inch/pulse	Writable	Rain meter scale factor.
10	Flows and volumes	Read only	Flows and volumes
10_1	Free flowGPM	Read only	Free flow
10_2	Pumped volume gal	Read only	Pumped volume
10_3	Sump volume gal	Read only	Sump volume
11	Sump form	Read only	Sump form
11_1	Area ft2	WritableCentral System Text Area (ft2)	This is the area that is used in the capacity calculations.
12	Capacity	Read only	Capacity
12_1	Calc. capacity P1GPM	Read only	Calc. capacity P1
12_1_1	Nominal capacity P1GPM	WritableCentral System Text Nominal capacity P1 (GPM)	Enter the nominal capacity of P1. Used for capacity alarms.
12_1_2	Capacity div. P1GPM	WritableCentral System Text Capacity divergence limit P1 (GPM)	Divergation limit for high and low capacity alarms. Uses nominal capacity +/- this channel.

No.	Menu name	Specification	Description
12_2	Calc. capacity P2GPM	Read only	Calc. capacity P2
12_2_1	Nominal capacity P2GPM	WritableCentral System Text Nominal capacity P2 (GPM)	Enter the nominal capacity of P2. Used for capacity alarms.
12_2_2	Capacity div. P2GPM	WritableCentral System Text Capacity divergence limit P2 (GPM)	Divergation limit for high and low capacity alarms. Uses nominal capacity +/- this channel.
12_3	Calc. capacity P3GPM	Read only	Calc. capacity P3
12_3_1	Nominal capacity P3GPM	WritableCentral System Text Nominal capacity P3 (GPM)	Enter the nominal capacity of P3. Used for capacity alarms.
12_3_2	Capacity div. P3GPM	WritableCentral System Text Capacity divergence limit P3 (GPM)	Divergation limit for high and low capacity alarms. Uses nominal capacity +/- this channel.
12_4	Calc. capacity P4GPM	Read only	Calc. capacity P4
12_4_1	Nominal capacity P4GPM	WritableCentral System Text Nominal capacity P4 (GPM)	Enter the nominal capacity of P4. Used for capacity alarms.
12_4_2	Capacity div. P4GPM	WritableCentral System Text Capacity divergence limit P4 (GPM)	Divergation limit for high and low capacity alarms. Uses nominal capacity +/- this channel.
12_5	Capacity calculation	Read only	Capacity calculation
12_5_1	Upper level capacity ft	WritableCentral System Text Upper level capacity (ft)	Upper level for capacity calculation. Has to be below the lowest start level.
12_5_2	Lower level capacity ft	WritableCentral System Text Lower level capacity (ft)	Lower level for capacity calculation. Has to be higher than the stop level.
13	Pump control...	Read only	Menu group for pump control
13_1	P1 state	Writable Alternative 0 = Auto 1 = Blocked	Program controlled automatic or blocked state for first pump.
13_2	P2 State	Writable Alternative 0 = Auto 1 = Blocked	Program controlled automatic or blocked state for second pump.
13_3	P3 state	Writable Alternative 0 = Auto 1 = Blocked	Program controlled automatic or blocked state for third pump.
13_4	P4 state	Writable Alternative 0 = Auto 1 = Blocked	Program controlled automatic or blocked state for fourth pump.
13_5	Stop delay time min:s	WritableCentral System Text Stop delay time (min:s)	Delays stopping of the pump by the preset time. Applicable to stop level 1 only
13_6	Max. no. run. pumps	WritableCentral System Text Max. number of running pumps	Specifies the maximum number of pumps running at the same time
13_7	Pump alternation	Writable Alternative 0 = Off 1 = On Central System Text Pump alternation	The Alternation menu specifies the pump operating sequence.
13_8	Alternating pumps	WritableCentral System Text Number of alternating pumps	Specifies the number of pump to use in the alternation.

No.	Menu name	Specification	Description
13_9	Time betw.starts, P1 min:s	WritableCentral System Text Time between starts, P1 (min:s)	Delay between two pump starts, counted from when P1 started.
13_10	Time betw.starts, P2 min:s	WritableCentral System Text Time between starts, P2 (min:s)	Delay between two pump starts, counted from when P2 started.
13_11	Time betw.starts, P3 min:s	WritableCentral System Text Time between starts, P3 (min:s)	Delay between two pump starts, counted from when P3 started.
13_12	Time betw.starts, P4 min:s	WritableCentral System Text Time between starts, P4 (min:s)	Delay between two pump starts, counted from when P4 started.
13_13	Auto start intrvl. h	WritableCentral System Text Auto start intrvl. (h)	If a pump has not been started within the set interval, the function will start the pump for a maintenance run, The running time is set in the Auto start time menu.
13_14	Auto start time min:s	WritableCentral System Text Auto start time (min:s)	The running time when started by the auto start function.0 - disables the function.
13_15	High level run time min:s	WritableCentral System Text High level run time (min:s)	Backup control activated when there is a level sensor failure. The high level switch activates the start of a pump (or two), which will then run for the period set in this menu.
13_16	Max. run time min:s	WritableCentral System Text Max. run time (min:s)	The maximum time the pumps are allowed to run continuously. 0 - disables the function.
13_17	Flushing interval h	Writable	Enter the number of pump cycles between each flushing
13_18	Flushing time min:s	Writable	Enter the time for which the flushing valve will be open0 - disables the function.
14	Alarm setup...	Read only	Menu group for alarm
14_1	General alarm delay min:s	WritableCentral System Text General alarm delay (min:s)	Delays the recording of an alarm. Used for all alarms except power failure alarm and low level.
14_2	Pow.fail alarm delay min	WritableCentral System Text Power failure alarm delay (min)	The delay of a Power failure alarm before it is recorded.
14_3	Low lev. alarm delay min:s	WritableCentral System Text Low level alarm delay (min:s)	The delay of a Low level alarm before it is recorded.
14_4	Blocking alarm delay min	WritableCentral System Text Blocking alarm delay (min)	The time the blocking signal must be active before an alarm is generated.
14_5	Work time min	Writable	Work time before an acknowledge is required from the personnel.
14_6	Warning time min	Writable	Warning time, during which an acknowledge from personnel is requested, before the personnel alarm is sent.
14_7	Transmit alarm	Writable Alternative 0 = Local1 = Remote2 = Clear Central System Text Transmit alarm	Alarm transmission.0 - Local. Alarms are not transmitted.1 - Remote. Alarms are transmitted to the Central system/SMS receiver.2 - Clear. Clears the alarm buffer and changes to Remote.
14_8	Auto remote mode min:s	Writable	The time after which the controller will revert to remote alarming mode.0 - disables the function.
14_9	D-alarm start time	Writable Interval 0 - 0	The start time for dialling out alarms with priority D.
14_10	D-alarm end time	Writable Interval 0 - 0	The stop time for dialling out alarms with priority D.

No.	Menu name	Specification	Description
14_11	Alarm priority 1	Writable Alternative 1 = Mains error2 = Low 24V Supply3 = Sensor Fault4 = Inval.setpoints5 = Blocked6 = High level float7 = High level8 = Low level float9 = Low level10 = High level+pfail11 = Failure 2 pumps12 = Tripped motor P113 = Tripped motor P214 = Tripped motor P315 = Tripped motor P416 = No response P117 = No response P218 = No response P319 = No response P4	Alarm priorities.
14_12	Alarm priority 2	Writable Alternative 1 = High current P12 = High current P23 = High current P34 = High current P45 = Low current P16 = Low current P27 = Low current P38 = Low current P49 = P1 max run time10 = P2 max run time11 = P3 max run time12 = P4 max run time13 = P1 switched off14 = P2 switched off15 = P3 switched off16 = P4 switched off17 = High temp. P118 = High temp. P219 = High temp. P320 = High temp. P4	Alarm priorities. Continuation.
14_13	Alarm priority 3	Writable Alternative 1 = P1 Spare alarm2 = P2 Spare alarm3 = P3 Spare alarm4 = P4 Spare alarm5 = Alarm input 16 = Alarm input 27 = Alarm input 38 = Alarm input 49 = Alarm input 510 = Alarm input 611 = Alarm input 712 = Alarm input 813 = High capacity P114 = High capacity P215 = High capacity P316 = High capacity P417 = Low capacity P118 = Low capacity P219 = Low capacity P320 = Low capacity P4	Alarm priorities. Continuation.
14_14	Alarm priority 4	Writable Alternative 1 = Pers. alarm2 = Overflow3 = High rain 5 min4 = High rain 24 h5 = Testcall ! 6 = I/O-mod not resp7 = Wrong I/O-module8 = Setpoint changed	Alarm priorities. Continuation.
14_15	Alarm texts...	Read only	Menu group for alarm texts
14_15_1	Alarm text input 1	WritableCentral System Text Alarm text input 1	Alarm text to use for general input 1.
14_15_2	Alarm text input 2	WritableCentral System Text Alarm text input 2	Alarm text to use for general input 2.
14_15_3	Alarm text input 3	WritableCentral System Text Alarm text input 3	Alarm text to use for general input 3.
14_15_4	Alarm text input 4	WritableCentral System Text Alarm text input 4	Alarm text to use for general input 4.
14_15_5	Alarm text input 5	WritableCentral System Text Alarm text input 5	Alarm text to use for general input 5.

No.	Menu name	Specification	Description
14_15_6	Alarm text input 6	WritableCentral System Text Alarm text input 6	Alarm text to use for general input 6.
14_15_7	Alarm text input 7	WritableCentral System Text Alarm text input 7	Alarm text to use for general input 7.
14_15_8	Alarm text input 8	WritableCentral System Text Alarm text input 8	Alarm text to use for general input 8.
14_16	Alarm code filter...	Read only	Menu group for alarm code filter
14_16_1	Alarm code input 1	Writable	Alternative alarm code to use for general input 1
14_16_2	Alarm code input 2	Writable	Alternative alarm code to use for general input 2
14_16_3	Alarm code input 3	Writable	Alternative alarm code to use for general input 3
14_16_4	Alarm code input 4	Writable	Alternative alarm code to use for general input 4
14_16_5	Alarm code input 5	Writable	Alternative alarm code to use for general input 5
14_16_6	Alarm code input 6	Writable	Alternative alarm code to use for general input 6
14_16_7	Alarm code input 7	Writable	Alternative alarm code to use for general input 7
14_16_8	Alarm code input 8	Writable	Alternative alarm code to use for general input 8
14_17	Test alarm...	Read only	Menu group for test alarm
14_17_1	Test alarm intervaldays	Writable	Test alarm interval. How often the test alarm shall be sent.
14_17_2	Test alarm time	Writable	Test alarm time. The time of the day, at which the test alarm is sent.
14_17_3	Test alarm state	Writable Alternative 0 = Off1 = On	Manual activation of the test alarm.Also reflects the current state of the test alarm.
15	Communication... (Card not installed)	Read only	Menu group for communication with the Central system/SMS.
15_1	Station number / id	Writable	The unique number of the station within the system.
15_2	Station name	WritableCentral System Text Station name	Enter the station name. This name will be used in SMS calls to a GSM telephone.
15_3	Telephone no. CS/SMS	WritableCentral System Text Telephone number to Central system / SMS	Telephone number to central system or SMS receiver. T=Tone dial. The telephone number is required for alarm handling to the central system or SMS receiver.
15_4	Telephone no. SMS 2	WritableCentral System Text Telephone SMS 2	Telephone number to SMS receiver. The telephone number is required for alarm handling to more than one SMS receiver.Only applicable when alarm handling using SMS is selected.
15_5	Telephone no. SMS 3	WritableCentral System Text Telephone SMS 3	Telephone number to SMS receiver. The telephone number is required for alarm handling to more than one SMS receiver.Only applicable when alarm handling using SMS is selected.

No.	Menu name	Specification	Description
15_6	Telephone no. SMS 4	Writable Central System Text Telephone SMS 4	Telephone number to SMS receiver. The telephone number is required for alarm handling to more than one SMS receiver. Only applicable when alarm handling using SMS is selected.
15_7	Telephone no. SMS 5	Writable Central System Text Telephone SMS 5	Telephone number to SMS receiver. The telephone number is required for alarm handling to more than one SMS receiver. Only applicable when alarm handling using SMS is selected.
15_8	SMS Acknowledge time min	Writable Central System Text SMS Acknowledge time (min)	The time the RTU waits for an acknowledge re-calling or SMS before sending the SMS alarm to the next telephone number in the list. 0 - disables the function. I.e. the SMS is send directly to all valid telephone numbers. Only applicable when alarm handling using SMS is selected.
15_9	SMS P-alarm	Writable Alternative 0 = No 1 = Yes Central System Text SMS P-alarm	Send SMS on deactivation of an alarm. Only applicable when alarm handling using SMS is selected.
15_10	Communication COM1	Writable Alternative 0 = None 1 = Hayes modem 2 = GSM/Hayes predefined 3 = RS232 HDX 4 = RS232 FDX 5 = User modem 6 = GPRS	Type of communication to use for the communication with the Central System/SMS.
15_11	Modem init 1	Writable	Initialization string for the modem. (part 1) Applies only when 'User modem' is selected as communication.
15_12	Modem init 2	Writable	Initialization string for the modem. (part 2) Applies only when 'User modem' is selected as communication.
15_13	Speed COM1bps	Writable Alternative 0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400 6 = 57600 7 = 115200	Speed to use for the communication with the Central System.
15_14	Parity COM1	Writable Alternative 0 = None 1 = Even 2 = Odd	Parity COM1
15_15	Protocol COM1	Writable Alternative 0 = AquaCom polled fixed1 = AquaCom dialled 2 = AquaCom/SMS 3 = Modbus fixed4 = Modbus dialled 5 = Comli fixed6 = Comli dialled 7 = AquaCom unpolled fix	Choice of transmission protocol to use for the communication with the Central System/SMS.
15_16	RTS delay COM1 ms	Writable	Delay for the RTS signal (request to send) in the communication with the Central System. Only in choice of RS 232 HDX.
15_17	CS IP address	Writable	The IP address to the Central System. Applies to communication with GPRS only
15_18	CS IP port	Writable	The IP port of the Central system. Applies to communication with GPRS only
15_19	Access point name 1	Writable	Access point name. (part 1) Applies to communication with GPRS only
15_20	Access point name 2	Writable	Access point name. (part 2) Applies to communication with GPRS only
15_21	Max buffer sizebytes	Writable	Limits the data size when collecting trend.
16	General...	Read only	Menu group for general set-points
16_1	Date and time	Writable	Setting of date and time.

No.	Menu name	Specification	Description
16_2	EX mode	Writable Alternative 0 = Off1 = On	When EX-mode is on, the pumps are not allowed to start unless water can be detected in the sump. The function is used primarily in explosive environment
16_3	Auto reset	Writable Alternative 0 = No1 = Yes Central System Text Tripped auto reset	Automatic reset of the motor protection in the case of an overcurrent failure.0 - No. Inactivated function. The RTU blocks the pump.1 - Yes. Activated function. The RTU will make a second attempt to start the pump.This function is only available when 'digital output 4' is configured as 'motor protection reset'
16_4	Trend resolution min	Writable	Trend resolutionThe granularity with which the trend data is stored and transmitted to the Central System.1 minute or 5 minute periods.
16_5	System version	Read only	The RTU system version. Please have this number ready when calling Flygt support.
16_6	APP 541 version	Read only	The RTU program version. Please have this number ready when calling Flygt support.
16_7	Program mode	Writable Alternative 0 = Run1 = Remote COM1	Run - The RTU is in normal operation controlling the pumps.Remote - The controller is waiting for a remote connection to be established, in order to perform some management activity. E.g. loading a new application program.
16_8	New password	Writable	Activates the service password, which prevents unauthorized access to service menus.The password is disable by the value 0000.
17	I/O setup...	Read only	Menu group for I/O setup
17_1	Number of pumps	Writable	Specifies the number of pumps connected in the station.
17_2	Status inputs	Writable Alternative 1 = 24V fail2 = 230V fail3 = P1 trip4 = P1 resp5 = P2 trip6 = P2 resp7 = P3 trip8 = P3 resp9 = P4 trip10 = P4 resp11 = General input 112 = General input 213 = General input 314 = General input 415 = General input 516 = General input 617 = General input 718 = General input 8	Status of the digital inputs.
17_3	Invert inputs	Writable Alternative 1 = 24V fail2 = 230V fail3 = P1 trip4 = P1 resp5 = P2 trip6 = P2 resp7 = P3 trip8 = P3 resp9 = P4 trip10 = P4 resp11 = General input 112 = General input 213 = General input 314 = General input 415 = General input 516 = General input 617 = General input 718 = General input 8	Inversion of digital inputs.Inverts an input from being NO (normally open) to NC (normally closed).0 - not inverted1 - inverted
17_4	Common alarm...	Read only	Menu group for common alarm output
17_4_1	Common alarm	Writable Alternative 0 = Continuous1 = Intermittent	Type of common alarm output.Continuous or pulsating.

No.	Menu name	Specification	Description
17_4_2	Com. alarm activ. 1	Writable Alternative 1 = Mains error 2 = Low 24V Supply 3 = Sensor Fault 4 = Inval.setpoints 5 = Blocked 6 = High level float 7 = High level 8 = Low level float 9 = Low level 10 = High level+pfail 11 = Failure 2 pumps 12 = Tripped motor P113 13 = Tripped motor P214 14 = Tripped motor P315 15 = Tripped motor P416 16 = No response P117 17 = No response P218 18 = No response P319 19 = No response P4	Selects which alarms that activates the common alarm output. (part 1)
17_4_3	Com. alarm activ. 2	Writable Alternative 1 = High current P12 2 = High current P23 3 = High current P34 4 = High current P45 5 = Low current P16 6 = Low current P27 7 = Low current P38 8 = Low current P49 9 = P1 max run time 10 = P2 max run time 11 = P3 max run time 12 = P4 max run time 13 = P1 switched off 14 = P2 switched off 15 = P3 switched off 16 = P4 switched off 17 = High temp. P118 18 = High temp. P219 19 = High temp. P320 20 = High temp. P4	Selects which alarms that activates the common alarm output. (part 2)
17_4_4	Com. alarm activ. 3	Writable Alternative 1 = P1 Spare alarm 2 = P2 Spare alarm 3 = P3 Spare alarm 4 = P4 Spare alarm 5 = Alarm input 16 6 = Alarm input 27 7 = Alarm input 38 8 = Alarm input 49 9 = Alarm input 510 10 = Alarm input 611 11 = Alarm input 712 12 = Alarm input 813 13 = High capacity P114 14 = High capacity P215 15 = High capacity P316 16 = High capacity P417 17 = Low capacity P118 18 = Low capacity P219 19 = Low capacity P320 20 = Low capacity P4	Selects which alarms that activates the common alarm output. (part 3)
17_4_5	Com. alarm activ. 4	Writable Alternative 1 = Pers. alarm 2 = Overflow 3 = High rain 5 min 4 = High rain 24 h 5 = Testcall ! 6 = I/O-mod not resp 7 = Wrong I/O-module 8 = Setpoint changed	Selects which alarms that activates the common alarm output. (part 4)
17_5	General inputs...	Read only	Menu group for general inputs
17_5_1	Function gen.input 1	Writable Alternative 0 = None 1 = P1 manual 2 = Power failure 3 = External alarm 4 = Blocking 5 = Personnel 6 = Rain meter 7 = Overflow 8 = Low level float 9 = High level float 10 = High temp. 11 = P1 Spare alarm Central System Text Function general input 1	Select function for general input 1. Default is 'High temp. P1'

No.	Menu name	Specification	Description
17_5_2	Function gen.input 2	Writable Alternative 0 = None1 = P2 manual2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. Central System Text P211 = P2 Spare alarm Function general input 2	Select function for general input 2.Default is 'High temp. P2'
17_5_3	Function gen.input 3	Writable Alternative 0 = None1 = P3 manual2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. Central System Text P311 = P3 Spare alarm Function general input 3	Select function for general input 3.Default is 'High temp. P3'
17_5_4	Function gen.input 4	Writable Alternative 0 = None1 = P4 manual2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. Central System Text P411 = P4 Spare alarm Function general input 4	Select function for general input 4.Default is 'High temp. P4'
17_5_5	Function gen.input 5	Writable Alternative 0 = None1 = P1 auto2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. Central System Text P111 = P1 Spare alarm Function general input 5	Select function for general input 5.Default is 'Overflow'
17_5_6	Function gen.input 6	Writable Alternative 0 = None1 = P2 auto2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. Central System Text P211 = P2 Spare alarm Function general input 6	Select function for general input 6.Default is 'Power failure'
17_5_7	Function gen.input 7	Writable Alternative 0 = None1 = P3 auto2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. Central System Text P311 = P3 Spare alarm Function general input 7	Select function for general input 7.Default is 'Low level float'

No.	Menu name	Specification	Description
17_5_8	Function gen.input 8	Writable Alternative 0 = None1 = P4 auto2 = Power failure3 = External alarm4 = Blocking5 = Personnel6 = Rain meter7 = Overflow8 = Low level float9 = High level float10 = High temp. P411 = P4 Spare alarm Central System Text Function general input 8	Select function for general input 8.Default is 'High level float'
17_6	I/O-module...	Read only	Menu group for I/O-module
17_6_1	Base IP address	Writable	Base IP address for the RTU and the I/O-module.2 consecutive addresses are required. The first address is used by the RTU. The second address is used by the I/O-module and does not have to be entered.
17_6_2	I/O-mod. MAC address	Writable	The MAC address of the I/O-module
17_6_3	IP timeout	Writable	The timeout for the IP communication with the I/O-module.
17_6_4	I/O module type	Read only	Type of I/O-module.
17_6_5	I/O-module version	Writable	I/O-module version. The value is fetch from the I/O-module
17_7	Outputs...	Read only	Menu group for Outputs
17_7_1	Function output 4	Writable Alternative 0 = Motorprotect. reset1 = Sprinkler2 = General output	Select if the outputs is to be used as motor protection reset or general purpose outputs.
17_7_2	Output 4 config.	Writable Alternative 1 = Power failure2 = High level3 = P1 failure4 = P1 blocked5 = P2 failure6 = P2 blocked7 = P3 failure8 = P3 blocked	Select which signals that shall activate the output 4.Applies only if general purpose outputs have been selected.
17_8	Diagnostic program	Writable Alternative 0 = Off1 = 1-39	Diagnostic program for test of the RTU
17_9	Flygt default	Writable Alternative 0 = No1 = Yes	Resets all settings to default.
18	Show more menus	Writable Alternative 0 = No1 = Yes	Shows hidden menus
19	Show more menus (password)	Writable	Shows hidden menus when password function is enabled. Enter password!
20	α Language	Writable Alternative 0 = English1 = Deutsch2 = Nederlands3 = Français4 = Dansk5 = Svenska6 = Norsk7 = Español8 = Magyar9 = Suomi10 = Italiano11 = PycckNN12 = Polski13 = English US	Select display language.

Appendix B: Tag List

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Addr	Object name	Type	Raw min	Raw max	Scale			RW	Description
					Unit system	Multiply byto get unit		
207	ALR_DigitalAlarmDelay	UNSIGNED INT	0	600	SI US	1 1	s sec	RW	Alarm delay.
208	ALR_Mode	UNSIGNED INT	0	2	SI US	1 1		RW	Alarm distribution mode: 0 = local, 1 = remote and 2 = clear.
296	ANA1_Input	UNSIGNED INT	0	6553 5	SI US	1 1		R	Raw value from the analog input 1.
297	ANA2_Input	UNSIGNED INT	0	6553 5	SI US	1 1		R	Raw value from the analog input 2.
298	ANA3_Input	UNSIGNED INT	0	6553 5	SI US	1 1		R	Raw value from the analog input 3.
93	LEV1_CalibrLevel	SIGNED INT	-9999	9999	SI US	0.01 0.0328 1	m feet	RW	Calibration level (offset when to get zero level).
98	LEV1_HighAlarmLimit	SIGNED INT	-9999	9999	SI US	0.01 0.0328 1	m feet	RW	High level alarm limit
102	LEV1_LowAlarmDelay	UNSIGNED INT	0	600	SI US	1 1	s sec	RW	Low level alarm delay.
101	LEV1_LowAlarmLimit	SIGNED INT	-9999	9999	SI US	0.01 0.0328 1	m feet	RW	Low level alarm limit
2	LEV1_Percent	UNSIGNED INT	0	100	SI US	1 1		R	Level in percent.
92	LEV1_Range	UNSIGNED INT	0	9999	SI US	0.01 0.0328 1	m feet	RW	Measure range for the level sensor.
1	LEV1_Value	SIGNED INT	-9999	9999	SI US	0.01 0.0328 1	m feet	R	Level in meters.
58	OFL_ActiveCountTotal	UNSIGNED INT	0	6553 5	SI US	1 1		R	Total number of overflows.
56	OFL_ActiveTimeTotal	UNSIGNED INT	0	6553 5	SI US	60 60	s sec	R	Total time in minutes of overflowing.
6	PI_Current	UNSIGNED INT	0	9999	SI US	0.1 0.1	A A	R	Current pump 1.
121	PI_HighCurrent	UNSIGNED INT	0	9999	SI US	0.1 0.1	A A	RW	High current alarm limit pump 1.
123	PI_LowCurrent	UNSIGNED INT	0	9999	SI US	0.1 0.1	A A	RW	Low current alarm limit pump 1.
34	PI_RunTimeDaily	UNSIGNED INT	0	6553 5	SI US	60 60	s sec	R	Run time in minutes of pump 1 in the present day.
36	PI_StartCountDaily	UNSIGNED INT	0	6553 5	SI US	1 1		R	Number of starts on pump 1 in the present day.
111	PI_StartLevel	SIGNED INT	-9999	9999	SI US	0.01 0.0328 1	m feet	RW	Start condition 1.
113	PI_StartUpTime	UNSIGNED INT	5	60	SI US	1 1	s sec	RW	PI start up block 5.0 - 60.0 second s
112	PI_StopLevel	SIGNED INT	-9999	9999	SI	0.01	m	RW	Stop condition 1.

Addr	Object name	Type	Raw min	Raw max	Scale			RW	Description
					Unit/system	Multiply by...	...to get unit		
8	P2_Current	UNSIGNED INT	0	9999	US	0.0328 1	feet	R	Current pump 2.
141	P2_HighCurrent	UNSIGNED INT	0	9999	SI	0.1	A	RW	High current alarm limitpump 2.
143	P2_LowCurrent	UNSIGNED INT	0	9999	SI	0.1	A	RW	Low current alarm limitpump 2.
38	P2_RunTimeDaily	UNSIGNED INT	0	6553 5	SI	60	s	R	Run time in minutes of pump 2 in the present day.
40	P2_StartCountDaily	UNSIGNED INT	0	6553 5	SI	1	sec	R	Number of starts on pump 2 in the present day.
131	P2_StartLevel	SIGNED INT	-9999	9999	SI	0.01	m	RW	Start condition 2.
133	P2_StartUptime	UNSIGNED INT	5	60	SI	1	s	RW	P2 start up block 5.0 - 60.0 second s
132	P2_StopLevel	SIGNED INT	-9999	9999	SI	0.01	m	RW	Stop condition 2.
10	P3_Current	UNSIGNED INT	0	9999	SI	0.1	A	R	Current pump 3.
161	P3_HighCurrent	UNSIGNED INT	0	9999	SI	0.1	A	RW	High current alarm limitpump 3.
163	P3_LowCurrent	UNSIGNED INT	0	9999	SI	0.1	A	RW	Low current alarm limitpump 3.
42	P3_RunTimeDaily	UNSIGNED INT	0	6553 5	SI	60	s	R	Run time in minutes of pump 3 in the present day.
44	P3_StartCountDaily	UNSIGNED INT	0	6553 5	SI	1	sec	R	Number of starts on pump 3 in the present day.
151	P3_StartLevel	SIGNED INT	-9999	9999	SI	0.01	m	RW	Start condition 3.
155	P3_StartUptime	UNSIGNED INT	5	60	SI	1	s	RW	P3 start up block 5.0 - 60.0 second s
152	P3_StopLevel	SIGNED INT	-9999	9999	SI	0.01	m	RW	Stop condition 3.
12	P4_Current	UNSIGNED INT	0	9999	SI	0.1	A	R	Current pump 4.
181	P4_HighCurrent	UNSIGNED INT	0	9999	SI	0.1	A	RW	High current alarm limitpump 4.
183	P4_LowCurrent	UNSIGNED INT	0	9999	SI	0.1	A	RW	Low current alarm limitpump 4.
46	P4_RunTimeDaily	UNSIGNED INT	0	6553 5	SI	60	s	R	Run time in minutes of pump 4 in the present day.
48	P4_StartCountDaily	UNSIGNED INT	0	6553 5	SI	1	sec	R	Number of starts on pump 4 in the present day.

Addr	Object name	Type	Raw min	Raw max	Scale			RW	Description
					Units system	Multiply byto get unit		
171	P4_StartLevel	SIGNED INT	-9999	9999	SI	0.01	m	RW	Start condition 4.
175	P4_StartUpTime	UNSIGNED INT	5	60	US	0.0328	feet	RW	P4 start up block 5.0 - 60.0 second s
172	P4_StopLevel	SIGNED INT	-9999	9999	US	1	sec	RW	Stop condition 4.
217	P4_AlarmDelay	UNSIGNED INT	0	600	SI	0.0328	m	RW	Power failure alarm delay.
53	RAIN_PulsCountDaily	UNSIGNED INT	0	9999	US	1	feet	R	The puls counter's value in the present day.
192	SI_AllowedPumpToRun	UNSIGNED INT	0	10	SI	0.0001	m	RW	Number of allowed pump to run.
50	SI_AlternationType	UNSIGNED INT	0	3	US	0.000328	feet	RW	Alternation type.
200	SI_HourRunInterval	UNSIGNED INT	1	200	SI	3600	s	RW	Force d pump start 96hour, interval 1 - 200 hours.
201	SI_HourRunTime	UNSIGNED INT	0	120	US	1	sec	RW	Force d pump start 96hour, run time.
198	SI_MaxAltPumps	UNSIGNED INT	0	10	SI	1	sec	RW	Max alternating pumps.
202	SI_MaxRunTime	UNSIGNED INT	0	3000	US	1	s	RW	Max Run time, Max: 50 min (30000).
204	SI_MinRunFloatHigh	UNSIGNED INT	0	3000	SI	1	sec	RW	High level float minimum run time sump.
196	SI_StopDelay	UNSIGNED INT	0	600	US	1	s	RW	Stop delay.
226	SYS_AppVerAqV	UNSIGNED INT	0	65535	SI	1	sec	R	Version of the AquaView application.
225	SYS_Language	UNSIGNED INT	0	12	US	1		RW	Chosen language.
584	SYS_PlantNo	UNSIGNED INT	0	65535	SI	1		R	Plant identifier number
295	SYS_Version	UNSIGNED INT	0	65535	US	1		R	System version.
100	D01_Active	DIGITAL	0	1				R	Digital input 1 is active.
101	D01_Alarm	DIGITAL	0	1				R	Alarm on digital input 1 is active.
106	D02_Active	DIGITAL	0	1				R	Digital input 2 is active.
107	D02_Alarm	DIGITAL	0	1				R	Alarm on digital input 2 is active.
112	D03_Active	DIGITAL	0	1				R	Digital input 3 is active.
113	D03_Alarm	DIGITAL	0	1				R	Alarm on digital input 3 is active.
118	D04_Active	DIGITAL	0	1				R	Digital input 4 is active.
119	D04_Alarm	DIGITAL	0	1				R	Alarm on digital input 4 is active.
124	D05_Active	DIGITAL	0	1				R	Digital input 5 is active.

Addr	Object name	Type	Raw min	Raw max	Scale			RW	Description
					Units system	Multiply byto get unit		
125	D05 Alarm	DIGITAL	0	1				R	Alarm on digital input 5 is active.
130	D06 Active	DIGITAL	0	1				R	Digital input 6 is active.
131	D06 Alarm	DIGITAL	0	1				R	Alarm on digital input 6 is active.
136	D07 Active	DIGITAL	0	1				R	Digital input 7 is active.
137	D07 Alarm	DIGITAL	0	1				R	Alarm on digital input 7 is active.
142	D08 Active	DIGITAL	0	1				R	Digital input 8 is active.
143	D08 Alarm	DIGITAL	0	1				R	Alarm on digital input 8 is active.
148	D09 Active	DIGITAL	0	1				R	Digital input 9 is active.
154	D10 Active	DIGITAL	0	1				R	Digital input 10 is active.
160	D11 Active	DIGITAL	0	1				R	Digital input 11 is active.
166	D12 Active	DIGITAL	0	1				R	Digital input 12 is active.
172	D13 Active	DIGITAL	0	1				R	Digital input 13 is active.
178	D14 Active	DIGITAL	0	1				R	Digital input 14 is active.
184	D15 Active	DIGITAL	0	1				R	Digital input 15 is active.
190	D16 Active	DIGITAL	0	1				R	Digital input 16 is active.
5	LEV1_DigHighAlarm	DIGITAL	0	1				R	Digital high level sensor alarm after delay.
6	LEV1_DigLowAlarm	DIGITAL	0	1				R	Low level float alarm.
2	LEV1_HighAlarm	DIGITAL	0	1				R	High level alarm is active.
11	LEV1_HiLevPxFailAlarm	DIGITAL	0	1				R	The level is high and in the same time there is a failure on at least one pump.
4	LEV1_LowAlarm	DIGITAL	0	1				R	Low level alarm is active.
10	LEV1_SensorAlarm	DIGITAL	0	1				R	Sensor failure alarm.
201	O01 Active	DIGITAL	0	1				R	Digital output 1 is active.
202	O02 Active	DIGITAL	0	1				R	Digital output 2 is active.
203	O03 Active	DIGITAL	0	1				R	Digital output 3 is active.
204	O04 Active	DIGITAL	0	1				R	Digital output 4 is active.
205	O05 Active	DIGITAL	0	1				R	Digital output 5 is active.
206	O06 Active	DIGITAL	0	1				R	Digital output 6 is active.
99	O01 Alarm	DIGITAL	0	1				R	Overflow alarm is active.
15	P1_Blocked	DIGITAL	0	1				R	Pump 1 is blocked.
14	P1_Error	DIGITAL	0	1				R	Pump 1 has an error.
22	P1_ErrorResponseAlarm	DIGITAL	0	1				R	No response alarm is active on pump 1.
20	P1_HighCurrentAlarm	DIGITAL	0	1				R	High current alarm is active on pump 1.
21	P1_LowCurrentAlarm	DIGITAL	0	1				R	Low current alarm is active on pump 1.
26	P1_MaxRunAlarm	DIGITAL	0	1				R	Max run alarm is active on pump 1.
18	P1_RemoteRun	DIGITAL	0	1				RW	Manual or remote start of pump 1.
13	P1_Response	DIGITAL	0	1				R	Response from pump 1.
12	P1_Run	DIGITAL	0	1				R	Pump 1 is running.
27	P1_SwitchOffAlarm	DIGITAL	0	1				R	Pump 1 is switched off, i.e. not in auto mode.
23	P1_ThermAlarm	DIGITAL	0	1				R	High temperature alarm is active on pump 1.
19	P1_TripAlarm	DIGITAL	0	1				R	Tripped alarm on pump 1.
31	P2_Blocked	DIGITAL	0	1				R	Pump 2 is blocked.

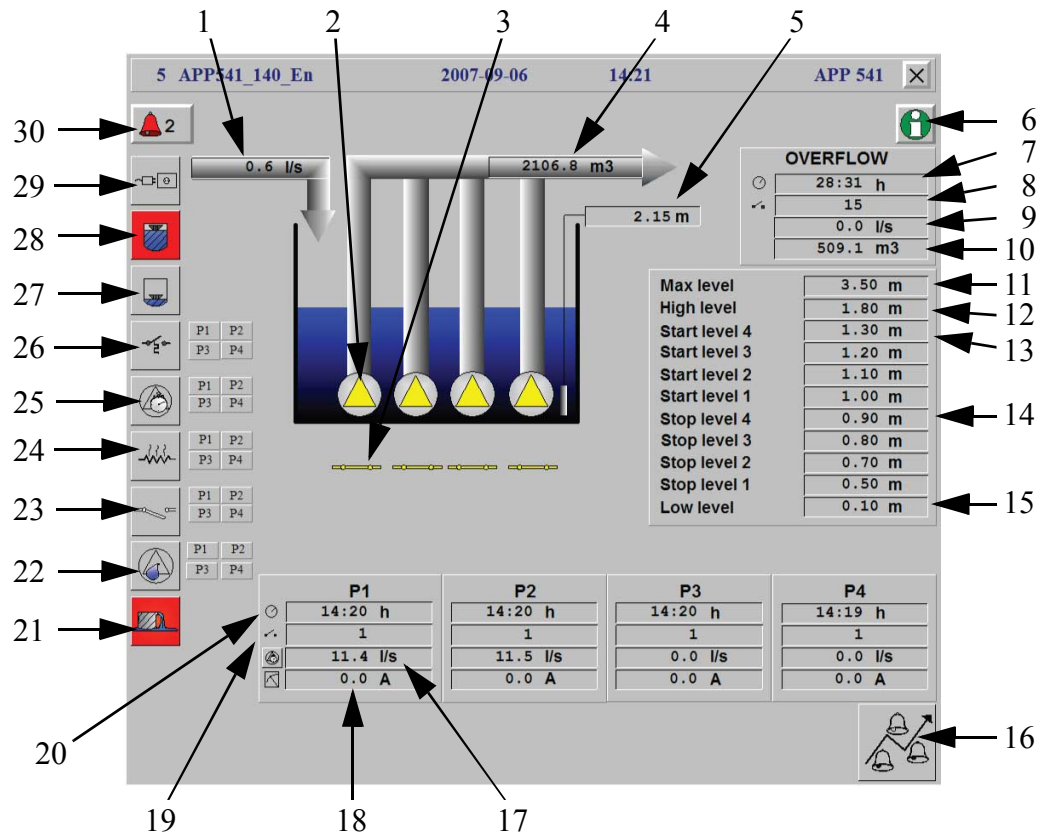
Addr	Object name	Type	Raw min	Raw max	Scale			RW	Description
					Unit system	Multiply byto get unit		
30	P2_Error	DIGITAL	0	1				R	Pump 2 has an error.
38	P2_ErrorResponseAlarm	DIGITAL	0	1				R	No response alarm is active on pump 2.
36	P2_HighCurrentAlarm	DIGITAL	0	1				R	High current alarm is active on pump 2.
37	P2_LowCurrentAlarm	DIGITAL	0	1				R	Low current alarm is active on pump 2.
42	P2_MaxRunAlarm	DIGITAL	0	1				R	Max run alarm is active on pump 2.
34	P2_RemoteRun	DIGITAL	0	1				RW	Manual or remote start of pump 2.
29	P2_Response	DIGITAL	0	1				R	Response from pump 2.
28	P2_Run	DIGITAL	0	1				R	Pump 2 is running.
43	P2_SwitchOffAlarm	DIGITAL	0	1				R	Pump 2 is switched off i.e. not in auto mode.
39	P2_ThermAlarm	DIGITAL	0	1				R	High temperature alarm is active on pump 2.
35	P2_TripAlarm	DIGITAL	0	1				R	Tripped alarm on pump 2.
47	P3_Blocked	DIGITAL	0	1				R	Pump 3 is blocked.
46	P3_Error	DIGITAL	0	1				R	Pump 3 has an error.
54	P3_ErrorResponseAlarm	DIGITAL	0	1				R	No response alarm is active on pump 3.
52	P3_HighCurrentAlarm	DIGITAL	0	1				R	High current alarm is active on pump 3.
53	P3_LowCurrentAlarm	DIGITAL	0	1				R	Low current alarm is active on pump 3.
58	P3_MaxRunAlarm	DIGITAL	0	1				R	Max run alarm is active on pump 3.
50	P3_RemoteRun	DIGITAL	0	1				RW	Manual or remote start of pump 3.
45	P3_Response	DIGITAL	0	1				R	Response from pump 3.
44	P3_Run	DIGITAL	0	1				R	Pump 3 is running.
59	P3_SwitchOffAlarm	DIGITAL	0	1				R	Pump 3 is switched off i.e. not in auto mode.
55	P3_ThermAlarm	DIGITAL	0	1				R	High temperature alarm is active on pump 3.
51	P3_TripAlarm	DIGITAL	0	1				R	Tripped alarm on pump 3.
63	P4_Blocked	DIGITAL	0	1				R	Pump 4 is blocked.
62	P4_Error	DIGITAL	0	1				R	Pump 4 has an error.
70	P4_ErrorResponseAlarm	DIGITAL	0	1				R	No response alarm is active on pump 4.
68	P4_HighCurrentAlarm	DIGITAL	0	1				R	High current alarm is active on pump 4.
69	P4_LowCurrentAlarm	DIGITAL	0	1				R	Low current alarm is active on pump 4.
74	P4_MaxRunAlarm	DIGITAL	0	1				R	Max run alarm is active on pump 4.
66	P4_RemoteRun	DIGITAL	0	1				RW	Manual or remote start of pump 4.
61	P4_Response	DIGITAL	0	1				R	Response from pump 4.
60	P4_Run	DIGITAL	0	1				R	Pump 4 is running.
75	P4_SwitchOffAlarm	DIGITAL	0	1				R	Pump 4 is switched off i.e. not in auto mode.
71	P4_ThermAlarm	DIGITAL	0	1				R	High temperature alarm is active on pump 4.
67	P4_TripAlarm	DIGITAL	0	1				R	Tripped alarm on pump 4.
87	P4LR_PersonnelAlarm	DIGITAL	0	1				R	Personnel alarm.
88	PF_Alarm	DIGITAL	0	1				R	Power failure alarm is active.
91	RAIN_24hAlarm	DIGITAL	0	1				R	The 24 h rain alarm is active.
90	RAIN_5minAlarm	DIGITAL	0	1				R	The 5 min rain alarm is active.
81	S1_2PumpFailure	DIGITAL	0	1				R	There are failures on 2 or more pumps.
80	S1_Alternation	DIGITAL	0	1				R	Alternation of/on.
79	S1_AutoResetEnable	DIGITAL	0	1				RW	Over current auto reset function enable.

Addr	Object name	Type	Raw min	Raw max	Unit system	Scale Multiply byto get unit	RW	Description
77	S1 RemoteBlock	DIGITAL	0	1				RW	P1/P2 Remote block pump.
78	S1 RemoteReset	DIGITAL	0	1				RW	Remote reset (resets alarms and pump errors).
200	S1 RevertAuto	DIGITAL	0	1				RW	Revert to automatic control of the pumps.
97	SYS ParamErrorAlarm	DIGITAL	0	1				R	Parameter error alarm.
85	TESTALR_ActiveAlarm	DIGITAL	0	1				R	Test alarm is active.

Appendix C: SCADA Systems

Flygt SCADA System (AquaView)

The figure below shows an example of the AquaView status view.



1. Free flow
2. P1 pump status
3. P1 relay status
4. Pumped volume
5. Level
6. RTU info
7. Overflow time
8. Overflow count
9. Overflow flow
10. Overflow volume
11. Max level
12. High level
13. Start level
14. Stop level
15. Low level
16. Alarm handling (local/remote)
17. P1 capacity
18. P1 current
19. P1 starts
20. P1 run time

21. Overflow
22. Leakage
23. Response err.
24. High temp.
25. Max runtime
26. Tripped
27. Low level
28. High level
29. Power failure
30. Active alarms

Status View

The status view shows:

- Momentary status of the station
- Daily operating data, *and*
- List of active alarms

Remote Control

The RTU can be controlled remotely:

1. Right-click in the status view to display a dialog box for remote control.
2. The RTU reverts to the automatic mode within 30 seconds after the modem has hung up.

Example: Object P1

- F1 = Start pump 1.
- F2 = Stop and block pumps.
- F3 = Return control to automatic.
- F4 = Reset unit.

RTU information

To show version information, click **RTU info**.

Setpoints

How to use setpoints:

- Setpoint values can be fetched and sent in random order.
Keep in mind: Maximum is 500 transmitted characters.
- Alarm code filter can be fetched and sent in random order.
- Alarm priorities can be fetched and sent in random order.

NOTICE:

Fetching alarm code filter or alarm priorities requires at least AquaView 1.23.01.

Report

The report data consists of daily data divided into time segments:

- 12:00 AM - 6:00 AM
- 6:00 AM - 9:00 AM
- 9:00 AM - 4:00 PM
- 4:00 PM - 12:00 AM

Available data is listed in the table below. The RTU stores this data for 31 days.

Text1	Text2	Text3	Description
Run time	P1	h:min	Running time pump 1.
...			...

Text1	Text2	Text3	Description
Run time	P4	h:min	Running time pump 4.
Overflow	time	h:min	Overflow time.
Starts	P1		Number of starts pump 1.
...			...
Starts	P4		Number of starts pump 4.
Rain		inch	Rain.
Overflow	count		Number of overflows.
Major	overflow	count	Major overflow count
Overflow	volume	gal	Overflow volume
Pumped	volume	gal	Pumped volume

Trend

The trend data consist of historical data with selectable sample resolution (1 or 5 minute average).

Available data is listed in the table below. The RTU stores this data for 4 days.

Text1	Text2	Text3	Description
Level		ft	Level
Current	P1	A	P1 current. (Maximum value in period).
...			...
Current	P4	a	P4 current. (Maximum value in period).
Rain	P1	inch	Rain. 5 minute running average.
Calculated	cap. P1	GPM	Calculated capacity P1
...			...
Calculated	cap. P4	GPM	Calculated capacity P4
Overflow	Level	ft	Overflow level
Overflow	Height	ft	Overflow height
Free flow		l/s	Free flow (inflow)

To set trend resolution in the RTU:

- Enter the preferred resolution in the Trend resolution menu (16_4).
- Keep in mind: Use the same trend resolution in the RTU as in AquaView.

Other SCADA Systems

The figure on next page shows a status view example using Citect.

Communication Methods

The RTU supports several communication methods for communicating with other SCADA systems:

Protocol	Connection type
Comli	Fixed
Comli	Dialled
Modbus	Fixed
Modbus	Dialled
Aquacom	Fixed
Aquacom	Dialled
Aquacom	Dialled + SMS Alarms

(Reference: Open Manual for further information on protocols).

Status View

The status view can show, for example:

- Momentary status of the station
- Daily operating data, *and*
- List of active alarms

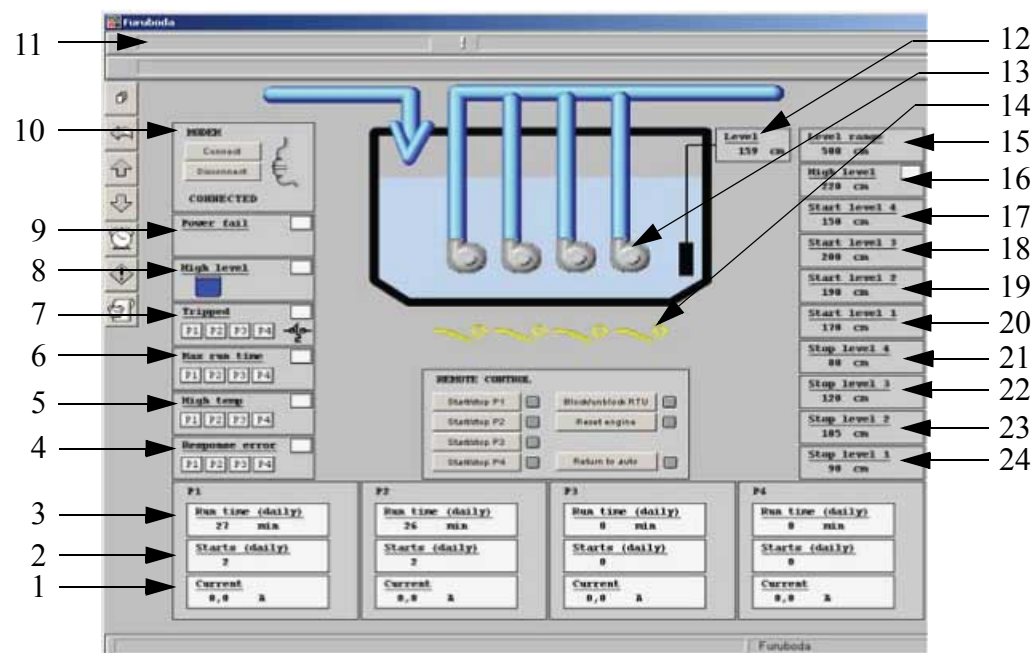
Additional parameters, alarms, and values supported by the RTU can be added to the status view. (Reference: "Appendix B: Tag List").

Remote Control

The following functions can be controlled remotely:

Start P1	Start Pump 1/Stop Pump 1
Start P2	Start Pump 2/Stop Pump 2
Block	Block all pumps
Reset	Reset motor protection
Resume to auto	Functions will no longer be controlled remotely

Keep in mind: If communication to the RTU is lost, the pump will return to automatic mode after 30 seconds.



1. Current
2. Starts daily
3. Run time daily
4. Response error
5. High temp
6. Max run time
7. Tripped
8. High level
9. Power fail
10. Modem Connection
11. Alarm list
12. Level
13. Pump status
14. Relay status
15. Level range
16. High level
17. Start level 4
18. Start level 3
19. Start level 2
20. Start level 1
21. Stop level 4
22. Stop level 3
23. Stop level 2
24. Stop level 1

Dialled Alarm Handling

When an alarm is triggered in the RTU, it will call the SCADA system in order to be polled by the SCADA system for the alarm list. For the SCADA system to recognize which RTU that is making the call, a caller id is sent to the SCADA system.

Structure: Caller id

The caller id is generated automatically by the RTU.

- Syntax: FLYGT_<protocol\>_<station number\>
- Example 1: If the protocol is Modbus and the station number is 31, the RTU generates the Caller id: FLYGT_MODBUS_31
- Example 2: If the station number is changed from 31 to 32, the RTU generates a new Caller id: FLYGT_MODBUS_32

Function: Alarm call

The table below shows an outgoing alarm call from the RTU to the SCADA system.

Phase	RTU	SCADA system
1	Alarm is generated.	
2	Calls the SCADA system.	
3	Sends its caller id.	Caller id field in the SCADA system must correspond to the caller id sent from the RTU.
4		If caller id is not supported by the SCADA system, it will request a PLC_ID from the RTU.
5		Polls the RTU for active alarms.
6	Acknowledges the alarms.	

Phase	RTU	SCADA system
7		Terminates the connection.

NOTICE:

To prevent the RTU from sending alarms not included in the SCADA system, change the alarm priority to "C" for relevant alarms in the RTU.

Max Buffer Size (Advanced Settings)

The information provided below is intended for integration purposes and should be used together with the Open manual.

The Scada system must not exceed the Max buffer size in the RTU when requesting registers or other data.

Protocol	Max No. of registers in one reply	Max No. of digital I/O in one reply.
Modbus	47	760
Comli(*)	32	512

Keep in mind: The max reply Buffer Size is 100 bytes.

(*) The limitation is in Comli, where the data bytes are limited to 64.

When a GSM modem is used, GSM-network delays may cause the SCADA system to timeout. To solve this:

- Increase the timeout setting in the SCADA system, *or*
- Decrease the number of registers/IO in each request.

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- 1) The tissue in plants that brings water upward from the roots
- 2) A leading global water technology company

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The original instruction is in English. All non-English instructions are translations of the original instruction.

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